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# ENTOMOLOGICAL NEWS

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## The Early Genera of Ithomiinae. (Lepidoptera: Nymphalidae).

By WM. T. M. FORBES, Cornell University, Ithaca, New York.

The Ithomiinae are a group whose natural arrangement has been disguised by much mimicry (Müllerian, of course) within the group. The present note is based on a survey of quite a number of characters, ignoring pattern features, in an attempt to judge what is the really most probable ancestral type, and the line of development of the higher genera.

In general we may take Schatz's arrangement in Staudinger's "Exotische Tagfalter," vol. 3, as representing the chief structural subdivisions and, with one or two exceptions, the genera. As to the primitive genera (his Gruppe I) there has been general acceptance of the more recent subdivision of *Tithorea*, and I shall for this note use the names that Seitz's "Macrolepidoptera of the World" has made familiar. The only other genus that needs subdivision is *Athesis*, whose *dercyllidas* group shows much divergence in pattern and some in structure from *A. clearista*. A striking likeness to *Hirsutis* in sex-tufting, wing-form and some details of pattern is not wholly supported by other structures; I shall leave its fuller discussion to Mr. Fox, but note here that it must lie between *Hirsutis* and *Athesis*—about as far off the main line of evolution as *Tithorea* is in another direction.

Pending Mr Fox's revision of the genera[1] I shall use the system of names established by Schatz and slightly extended by Haensch in the "Macrolepidoptera of the World".

Schatz's "Gruppe I" is defined in the male by having a clearly separate tibia and tarsus of the male fore leg, which is normally almost as long as the femur. Two exceptions make a little trouble—in *Thyridia* (*Methona*) the tibia and tarsus, while distinct, are much shorter than the femur, and in *Melinaea egina* (with its form *paraiya*) the tibio-tarsus is reduced to the

[1] Since published in Trans Amer. Ent Soc 66: 161-207, 1940.

same little knob so typical of "Gruppe II". *M. comma* has reached about the stage of reduction of *Thyridia,* but varies individually. On the other side of the boundary *Aprotopus* has the tibio-tarsus less reduced than the residue of group II. Personally I believe it is a separate reduction from something not unlike *Thyridia,* and merely parallel to the *Mechanitis* and *Ithomia* types.

Group I is then taken to include *Hirsutis, Tithorea, Athesis, Olyras, Eutresis, Athyrtis, Melinaea* and *Thyridia,* with *Aprotopus* as a doubtful appendage.

To determine the ancestral form we may take *Tellervo* as a norm. Whether actually Ithomiid, or a distinct subfamily as now listed (see Ent. Am. xix, 102) it is certainly nearer to the ancestral stem than any other living type. It shares with other early Nymphalidae the following features which vary significantly within the remaining genera of "Group I": M-spur attached to middle discocellular[2] in both wings; lower discocellular forming an acute angle with m-cu, the cubitus being of the "trifid" type; Sc and R of hind wing widely separated at origin, as in normal Nymphalidae; hum. forming a wide and fairly symmetrical Y-fork, cell of hind wing much shorter than free part of R. We may also note that Sc is long and similar in both sexes, unlike the Melinaea and Mechanitis groups, and that the scaling, while somewhat thin, is not degenerate.

Comparing our list of genera to this set of characters it turns out that *Hirsutis* comes definitely nearest, differing in the simpler hum. and movement of the M-spur to ldcv, but even the latter has only reached $M_3$ in some specimens. This is also one of the genera that sometimes has $R_3$ free, as in *Tellervo,* though never so far back on the cell. Our female of *H. togarma* shows this. The rest of the genera fall into a single line, as listed above, ending in *Aprotopus,* each genus being like those immediately before and after in more features

[2] This is the upper M-spur, i. e., $M_{1+2}$; the lower one, $M_3$, while equally clear in *Tellervo,* is weak or reduced to a fold in the proper Ithomiinae—it always arises from ldcv.

than to any others. The only possible other candidates for position next to *Tellervo* are *Tithorea,* on account of its more perfectly separate Sc and R, and *Athesis acrisione,* which still has the M-spur on the mdcv of a perfectly "trifid" wing. The remaining genera with high M-spur are quadrifids, and the spur has no doubt moved up secondarily to the migration of $M_3$ itself.

The successive steps of development may be noted as follows, though the actual arrangement was made on the basis of some 20 characters, both superficial and genitalic.

At *Athesis* Sc and R of female hind wing become distinctly approximate at base; with *Olyras* the angle between udcv and m-cu of hind wing becomes obtuse, though the venation is not truly quadrifid till we come to *Athyrtis;* the free part of R in the male also becomes much shorter than the cell at *Olyras.*

With *Thyridia* the distal fork of hum. becomes very long and the uncus becomes much reduced; Sc and R are closely parallel for a greater distance than in the preceding genera, and the general transparent ground is unlike any of the preceding, though approached by the extensive transparent spotting of *"Athesis" hewitsoni.* In each of these points *Aprotopus* resembles *Thyridia,* and the closely parallel Sc and R is the only one really typical of group II. Only the relatively long R suggests an origin from an earlier genus, perhaps *Athesis.*

Other features tend strongly to tie neighboring genera, but are not too consistent: thus the narrow V-shaped juxta is present in *Hirsutis, Athesis* (including *dercyllidas*) and *Tithorea,* and not in *Olyras, Eutresis, Thyridia* or *Aprotopus,* but it does reappear in *Melinaea.* A specialized costal process of the valve is limited to *Athyrtis* and *Melinaea,* which on all points make a subgroup together, but *Thyridia* has a different specialization of the costa—a rough thickening that reaches from the joint clear to the apex of the valve. The thin penis links together *Athesis* and *Olyras,* but reappears in *Aprotopus.*

As to the origin of Group II, I have already noted the marked likeness, deep as well as superficial, between *Aprotopus* and *Thyridia.* Tabulation of the same list of characters in a

couple of other genera, shows a marked linkage between *Mechanitis* and *Melinaea* (and of course *Scada,* with *Heteroscada,* and *Sais* must follow *Mechanitis*), but the later genera with their decidedly "trifid" venation seem to my eye to link more closely with *Athesis.* So my present opinion is that group II is triphyletic: *a, Aprotopus,* to be treated like *Melinaea egina* as a sporadic reduction of group I; *b, Mechanitis, Scada* and *Sais; c,* the residue. *Velamysta* shows the short spur of Sc arising from far out on the cell in the female, like *Mechanitis,* but I should put more weight on the character of udcv, which is quite normal for the *Ithomia-Heterosais* series.

## On Two Species of Diploplectron from Texas (Hymenoptera: Sphecidae).

By V. S. L. Pate, Cornell University.

In 1902, James A. G. Rehn and the late Henry Lorenz Viereck made their first collecting trip to the southwestern United States. Much of the material taken on that expedition has long since been reported upon, yet there still remains, in the collections of the Academy of Natural Sciences of Philadelphia, a considerable residue, at least of the smaller Hymenoptera, to be studied. Recently while sorting this material, the following interesting new forms were discovered and are herewith described.

**Diploplectron vierecki**[1] new species.

The black head and thorax and bright ferruginous abdomen immediately distinguish the present and the following new form from all other Nearctic *Diploplectra.* The closest ally of *vierecki* is apparently *D. bidentatus* Ashmead, but in addition to the different general livery, the present species may be separated from that form by the unclouded fore wing, the immaculate clypeus and front, and the much smaller clypeal teeth.

*Type.* ♂; Foothills of the Franklin Mountains north of El Paso, El Paso County, Texas. Elevation, 3713-4000 feet.

[1] After its collector, the late Henry Lorenz Viereck.

April 5, 1902. (H. L. Viereck.) [Academy of Natural Sciences of Philadelphia, Type no. 10571.]

♂. 4.5 mm. long. Black; mandibles, save for red apices, deep yellow; antennae dark fuscous; legs distad of femora deep fulvous; tegulae and axillary sclerites fuliginous; abdomen bright ferruginous. Wings clear hyaline, iridescent, hind wings with an ovate fuscous cloud subapically; veins and stigma deep fulvous.

Head fulgid; front, vertex, post-temporal region and clypeus with a sparse clothing of short, suberect, dark aenous setulae. Front inconspicuously tumid; with a microscopically fine shallow, clathrate foveolation superposed upon which are a few small, irregularly disposed, shallow alveoli; bisected discally by a short furrow. Vertex sculptured like front but more finely so; postocellar distance one and one-half times the length of ocellocular line; temples subnitidous and subglabrous. Antennae reaching to a little beyond tegulae; the antennocular line two and one-half times the interantennal distance; scape short, stout, about one-third (.36) the vertical length of eye; pedicel subcylindrical, five-eighths the length of first flagellar article; flagellum simple, finely puberulent, first two segments subequal in length. Clypeus narrow, transverse, median length two-sevenths the vertical length of eye, flat laterally but rather strongly obtrapezoidally tumid and subnitidous discally, ending medio-apically in an obtusely pointed lobe bearing two very small median teeth distally.

Thorax more or less fulgid; with a moderate clothing of suberect, rather long whitish pubescence dorsally, pleura and sterna more scantily clothed with long, suberect, dark aeneous setulae. Pronotum rounded anteriorly and laterally; with scattered fine punctures, and traversed by a few horizontal, inconspicuous rugulae; tubercles almost attaining tegulae. Mesonotum with small, moderately close punctures; scutellum flat, nitidous and glabrous discally; postscutellum subnitidous medially. Mesopleura without epicnemium anteriorly; episternal suture and episternaulus distinct and well impressed; prepectus and below episternauli with inconspicuous horizontal striae and a few scattered fine punctures, above episternauli and behind episternal suture glabrous and nitidous. Metapleura glabrous, subnitidous, with very inconspicuous horizontal striae. Propodeum with dorsal face glabrous, opaque, granulate tending to become finely transversely rugulate, the anterior margin with fine irregular reticulations, somewhat depressed medio-posteriorly; posterior face subfulgid, with erect, rather long

whitish pubescence, discally with an indistinct cuneiform impression, laterad of which surface is finely and irregularly punctate and rugulate; lateral faces fulgid, with rather long, erect whitish pubescence and a few parallel subhorizontal striae.

Legs with middle and hind tibiae bearing a few weak spines.

Fore wing with third submarginal cell twice as long on cubitus as on radial vein.

Abdomen fulgid; with microscopically fine, transverse clathrate aciculation. Tergites and sternites with a transverse subapical row of short decumbent fine setulae; pygidium small, elongate trapeziform, glabrous, perfulgid, with a few small, coarse, well separated punctures; ultimate sternite elongate, linguiform.

♀. Unknown. *Paratypes.* 2 ♂; Topotypical; April 4, 1901, April 5, 1902; [A. N. S. P.]

The paratypes agree with the type in all essential details of livery and structure, except that in the specimen taken April 5th ,1902, the second and third transverse cubital veins of the fore wing have anastomosed anteriorly just before their reception on the radial vein.

**Diploplectron kantsi**[2] new species.

Although resembling *vierecki* so closely as to be easily confused with it, *kantsi* differs from that form in a number of details, notably in the shape of the clypeus, the penult abdominal sternite, the venation of the fore wing, its opaque granular head and thorax, the different postocellar-ocellocular ratio, and the longer, differently proportioned antennal segments.

*Type.* ♂; Foothills of the Franklin Mountains north of El Paso, El Paso County, TEXAS. Elevation, 3713-4000 feet. April 6, 1902. (Henry L. Viereck.) [Academy of Natural Sciences of Philadelphia, Type no. 10572.]

♂. 5 mm. long. Black; mandibles dark miniatous; antennae dark fuscous; legs distad of femora deep fulvous; tegulae and axillary sclerites fuliginous; abdomen ferruginous. Wings hyaline, uniformly tinged throughout with light fulvous; hind wings with a small diffuse light fuscous cloud subapically; veins and stigma fuliginous.

Head opaque; sparsely clothed with decumbent whitish pubescence. Front finely granulate, bisected discally by a short

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[2] Named after the Lipan Indians, who were given the name Kantsi by the Caddo.

furrow. Vertex subgranular; postocellar distance about one-half the length of ocellocular line; temples subfulgid, with microscopically fine, shallow, clathrate faveolation. Antennae long, reaching at least to middle of scutellum; antennocular line two and one-half times the interantennal distance; scape short, stout, one-fourth the vertical length of eye; pedicel subcylindrical, one-third the length of the elongate first flagellar article; flagellum somewhat compressed, first two segments elongate, the second five-sixths the length of first article. Clypeus subopaque, narrow, transverse, median length one-fourth the vertical length of eye, flat laterally to obtrigonally tumid discally, ending medio-apically in an obtusely pointed lobe bearing two minute median teeth distally.

Thorax granular, more or less opaque; thinly clothed with suberect, rather long whitish pubescence. Pronotum rounded anteriorly and laterally; the tubercles almost attaining the tegulae. Mesopleura granulate throughout, with episternal suture and episternauli distinct and well developed. Metapleura glabrous, finely granulose. Propodeum opaque, granulose throughout; dorsal face glabrous; posterior and lateral faces scantily clothed with short suberect light pubescence; posterior face with a median cuneiform impression dorsad.

Legs with middle and hind tibiae bearing a few weak spines.

Fore wings with first transverse cubital vein bearing a spur directed toward the base of stigma; second submarginal cell subtrigonal, the second and third transverse cubital veins coming together to a point on radius; third submarginal cell twice as long on radius as on cubitus.

Abdomen more or less fulgid; with microscopically fine, transverse clathrate aciculation. Tergites and sternites with a transverse subapical row of short decumbent fine setulae; pygidium small, elongate, narrow trapeziform, developed only on posterior half of ultimate tergite, and glabrous, perfulgid, with a few punctures; ultimate sternite elongate linguiform apically, penult sternite trigonal, narrowly truncate and notched medio-apically, the posterior half somewhat compressed.

♀. Unknown. This species is known at present from only the unique male described above.

# Notes on Costa Rican Mycetophilidae (Diptera).

By ELIZABETH G. FISHER, Academy of Natural Sciences of Philadelphia.

Dr. Alan Stone has kindly called my attention to the fact that *Leia analis* Fisher (Trans. Am. Ent. Soc. *65*: 232-233. 1939) is a homonym of *Leia analis* Meigen (Syst. Beschr. *1*: 257. 1818). The latter is now considered to belong to the genus *Boletina*. I therefore propose the name *Leia costaricensis* new name for *Leia analis* Fisher.

The four males identified by me as *Platyura* (*Proceroplatus*) *pictipennis* Williston are a distinct species. Dr. F. W. Edwards has sent me a rough sketch of the dry male terminalium of Williston's type in the British Museum. It differs from that figured by me. (Fisher 1. c. pl. 13, fig 6). I therefore describe the Costa Rican species below:

**Platyura (Proceroplatus) vittata** new species

1939. *Platyura* (*Proceroplatus*) *pictipennis* Williston, Fisher Trans. Am. Ent. Soc. *65*: 228, pl. 13, fig. 6.

This species is close to *Platyura pictipennis* Williston differing in terminalial structure as well as in color. These color differences are described in the author's paper referred to above.

♂. Total length 2.8 to 3 mm. Face yellow; vertex dark brown, deep black around the ocelli. Palpi dark brown. Mesonotum brown with a wide median yellow stripe, the humeral angles and the lateral margins whitish. Pleura whitish yellow except the pleurotergites which are deep brown. Scutellum yellow. Apex of the postnotum deep brown. Mesonotum uniformly setose. Anepisternites and pleurotergites with setae. Halteres yellow, knob brown. Legs yellow. Fore tibia longer than fore basitarsus (1. 5: 1.). Abdomen brown to blackish-brown, except the first segment which is entirely yellow; the second to fifth tergites with yellow posterior margins, the sixth and seventh tergites deep brown .

Type: ♂ ; San José, COSTA RICA (H. Schmidt). June *27*, 1930. [Acad. Nat. Sci. Phila. no. 6626].

*Paratypes*: 3 ♂ ; San José, Costa Rica (H. Schmidt). April (defective) May *7*, June 23, 1930.

# Some of the Eumolpinae and Chrysomelinae of South Dakota (Coleoptera).

By PAUL H. JOHNSON, Mexico, Missouri.

The specimens seen were those in the collection of the Entomology-Zoology Department of the South Dakota State College at Brookings.

This collection is composed of the Truman collection, and of collections made by various members of the Entomology Department of State College. The Truman collection was bought by State College after his death, which occurred in the early 1900's. Very few of the specimens in the Truman collection have date labels, and the locality labels at times seem to be incorrect. The collections of the Entomology Department have been state-wide in extent and have been carried on for a number of years.

The specimens in the Truman collection have no collector labels, so any specimen in that group is marked by a "T" in the list. Other collectors were John Hetland, G. I. Gilbertson and H. C. Severin. All specimens collected by these men are marked in the list by the initials of their surnames.

There were twenty-four species, representing eleven genera, of th tribe Chrysomelinae in the collection. Of the eleven genera two (*Phaedon* and *Prasocuris*) may not occur in the State. *Phaedon* was found only in the Truman collection, and the species represented is not likely to inhabit South Dakota. *Prasocuris* was found only in the Truman collection.

There were twenty species of Eumolpinae representing thirteen genera found in the collection. This is not including *Fidia viticida* Walsh, which occurs in the State, but was not represented in the collection. The only doubtful genus in the Eumolpinae is *Colaspidea*. There were four of these in the Truman collection; three were from Los Angeles, California, and the other was labeled Volga, South Dakota.

## EUMOLPINAE.

ADOXUS OBSCURUS (Linn.), 1 specimen, Englewood (June) G.

A. OBSCURUS VITIS (Fab.), 8 specimens, Englewood (June) G.

MYOCHROUS MOVALLUS Johnson, 5 specimens, Elk Point (June) G.

M. SQUAMOSUS Lec., 16 specimens, Whitewood (June) G., Martin (June) G., Canton (June) G., Buffalo (June) G., Philip (June) G., Orman Dam (July) G., Houghton (June) G., Belle Fourche (June) G.

GLYPTOSCELIS ALBIDA Lec., 1 specimen, Newell (July) G.

(G. CRYPTICA (Say), not in collection, but probably in state.)

COLASPIDEA VARICOLOR Crotch, 1 specimen, Volga T. (Leng lists this species from Southern California.)

PARIA CANELLA ATERRIMA (Oliv.), 14 specimens, Philip (June) G., Volga T., Chester (June) G., Belle Fourche (June) G., Colton (June) G., Oelrichs (June) G.

P. CANELLA GILVIPES Horn, 1 specimen, Lake Oakwood (July) S.

P. CANELLA THORACICA (Melsh.), 2 specimens, Oelrichs (June) G., Browns Valley (June) G.

P, CANELLA QUADRINOTATA (Say), 15 specimens, Colton (June) G., Brookings (May) S., Springfield (June) G., Yankton (June) G., Chester (June) G.

P. CANELLA VITTATA Horn, 4 specimens, Volga T., Colton (June) G.

P. CANELLA QUADRIGUTTATA Lec., 5 specimens, Volga T., Springfield (June, August) G.

P. CANELLA SEXNOTATA (Say), 1 specimen, Volga T.

P. CANELLA PUMILA Lec., 1 specimen, Volga T.

CHRYSOCHUS AURATUS (Fab.), 15 specimens, Volga T., Nowlin T., Brookings (June, July) S., Vermillion (July) S., Lennox (August) S., Martin (June) G., Watertown T., White (July) S., Aberdeen (July) S.

C. COBALTINUS Lec., 8 specimens, Volga T., Aurora county T., Brookings, (June, September) S.

XANTHONIA DECEMNOTATA (Say), 9 specimens, Big Stone

(August) S., Whitewood (July) G., Springfield (June) G., Lake Hendricks (August) S.

(X. villosula (Melsh.), not in collection, but probably in state.)

(Fidia viticida Walsh, not in collection, but known to be at Yankton and Elk Point.) Severin.

Graphops pubescens (Melsh.), 2 specimens, Parmelee (June) G., Martin, in sand hills, (August) G.

G. curtipennis (Melsh.), 2 specimens, Custer (September) G., Kadoka, in Bad Lands, (August) G.

Metachroma dubiosum (Say), 3 specimens, White (July) G., Little Bend (August) G., Martin, in sand hills, (June) G.

M. interruptum (Say), 2 specimens, Elk Point (June) G.

M. parallelum Horn, 2 specimens, Elk Point (June) G.

Colaspis favosa Say, 28 specimens, South Dakota T., Brookings T. (July) S., Clark (July) S., Volga T., De Smet (July) G., Springfield (June) G., McNelly (June) G.

Rhabdopterus picipes (Oliv.), 14 specimens, Newell (July) G. S., Springfield (June) G., Vermillion (June) S., Browns Valley (June) G.

Nodonota tristis (Oliv.), 38 specimens, Volga T., Whitewood (July) G., Lakeview (June) G., Parmelee (June) G., Hot Springs (June) G., Springfield (June) G., Rapid City (June) G., Elk Point (June) G., Martin, in sand hills, (June) G., Pine Ridge (June) G.

N. convexa (Say), 1 specimen, Elk Point (June) G.

N. puncticollis (Say), 181 specimens, Volga T., Brookings T., South Dakota T., Volin (June) G., Whitewood (June, July) G., Springfield (June) G., Newell (July) G., Tabor (June) G., Chester (June) G., White, in Warrens Wood, (August) G., Rosebud (June) G., Lake Hendricks (July) G.

Chrysodina globosa (Oliv.), 26 specimens, Capa (June) S., Armour (June) S., Mitchell (June) S., Parmelee (June) G., Springfield (June) G., Lakeview (June) G., Martin, in sand hills, (June) G., Vivian (June) G., Interior (June) G., Hot Springs (June) G., Fox Ridge (June) G., Pine Ridge

(June) G., Rapid City (June) G., Buffalo (June) G.

CHRYSOMELINAE.

PRASOCURIS PHELLANDRII (L.), 2 specimens, Volga T.

(P. VITATTA (Oliv.), not in collection, but may be in State.)

LABIDOMERA CLIVICOLLIS (Kby.), 21 specimens, Volga T., Elk Point (June) G., Brookings T. (June, August) G. S., Big Stone City T., Springfield (June) G., Canton (August) G., Aurora county T., Capa (August) S.

LEPTINOTARSA DECEMLINEATA (Say), 19 specimens, Brookings (June, July) S. T., Yankton (June) G., Capa (August) S., Volga T.

ZYGOGRAMMA EXCLAMATIONIS (Fab.), 39 specimens, Volga T., Yankton (August) S., Claremont (August) S., Aberdeen (July) S., White Lake (August) G., Lake Oakwood (June) G., Pierre T., Grass Rope (August) G., Philip (June) G., Newell (July) G., Wewela (August) G., Vivian (June) S., Nowlin T., Custer T., Provo (June) G., Rapid City (June) T. G., White River (June) S., Fairfax (August) S.

Z. CONJUNCTA Rogers, 28 specimens, Newell (June, July) G.

Z. SUTORALIS CASTA Rogers, 37 specimens, Volga T., Brookings (August) S. T., Lake Oakwood (June, August) S. G., Vermillion (July) S., White (July) S., Lake Preston (May) S., Colton (August) S., Lennox (August) S., Mitchell (June) S., Lake Hendricks (July) G., Ipswich (July) S., Whitewood (July) G., Rapid City (June) G., Wewela (August) G., Grass Rope (August) G., Yankton (August) G.

CALLIGRAPHA LUNATA (Fab.), 28 specimens, Lake Preston (May) S., White (July) S., Sisseton (July) S., Claremont (August) S., Interior (August) S., Kadoka, in Bad Lands, (August) S., Camp (Fort) Crook (July) S., Wasta (September) S., Capa (August) S.

C. SIMILIS Rogers, 6 specimens, Volga T., Mitchell (August) S., Lake Campbell (August) S., Waubay (September) G., Newell (July) G., Fairfax (August) S.

C. INCISA Rogers, 11 specimens, Brookings T., White (July) S.

C. PRAECELSIS Rogers, 11 specimens, Volga T., Brookings (May, June, August) S., G. T., Springfield (August) G., Canton (June) G.

C. ELEGANS (Oliv.), 29 specimens, Volga T., Brookings (May) S., Yankton (August) S., Lake Oakwood (June) G., Waubay (September) G., Lake Campbell (August) S., Madison (June) S., Newell (July) G., Camp (Fort) Crook (July) S., Englewood (June) G., Martin, in sand hills, (August) G.

C. SCALARIS Lec., 4 specimens, Brookings (July) S., Springfield (June) G., Yankton (August) G., Mitchell (June) S.

C. MULTIPUNCTATA (Say), 71 specimens, Volga T., Elk Point (June) G., Brookings (June, July, August) S. G., Aberdeen (July) S., White (July) S., Lake Preston (August) S., Sisseton (July) S., Newell (July, August) G. H. S.

CHRYSOMELA FLAVOMARGINATA Say, 25 specimens, Volga T., Newell (July) G., Rapid City (June) G., Martin (June) G., Buffalo (June) G., Pine Ridge (June) G., Cave Hills (July) S.

C. AURIPENNIS Say, 1 specimen, Meckling (June) G.

PHAEDON OVIFORMIS (Lec.), 4 specimens, Volga T.

P. VIRIDIS (Melsh.), none in collection from the State, but it may be present.

GASTROIDEA POLYGONI (L.), 96 specimens, Volga T., Brookings (June) T., Lead (July) G.

G. CYANEA (Melsh.), 26 specimens, Volga T., Springfield (June) G. S., Canton (June) G., Yankton (April) S., Newell (June, July) G.

G. VIRIDULA (De Geer), 23 specimens, Pierre (May) S., Rapid City (June) G.

LINA INTERRUPTA Fab., 198 specimens, Volga T. S., Elk Point (June, August) G., Brookings (June, July) S. G., Springfield (June) G., Canton (April, August) S. G., Yankton (April) S., Colton (August) S., Pierre T., Sioux Falls (August) S., Wentworth (August) S., Capa (May) S., Newell (July) G. S., Nisland (July) S.

L. INTERRUPTA QUADRIGUTTATA Sch., 26 specimens, Volga T., Salem (May) S.

L. TREMULAE (Fab.), 42 specimens, Newell (July) G., Custer T., Rapid City (June) G., Whitewood (June, July) G., Engle-

wood (June, July) G., Lead (July) G., Deadwood (July) G.

L. SCRIPTA (Fab.), 71 specimens, Volga T., Brookings (July, August) S. T., Colton (July) S., Pierre T., Wentworth (August) S., Sioux Falls (August) S., Capa (June) S., Newell (July) G.

PHYTODECTA AMERICANA Sch., 8 specimens, Englewood (June) G., Deadwood (July) G. S., Determination confirmed by H. S. Barber.

PHYLLODECTA AMERICANA Sch., 4 specimens, Englewood (June) G., Sylvan Lake (September) G. Determination confirmed by H. S. Barber.

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## Damage to Entomological Collections in the British Museum of Natural History.

*Science* for December 6 and 13, 1940, states that the Museum has been hit by high explosive and incendiary bombs and that the department of entomology was damaged, especially by water seepage.

# Notes on Florida Odonata.

By M. J. WESTFALL, JR., Baker Museum, Rollins College, Winter Park, Florida.

While connected with the Baker Museum during the past three years I have done considerable field work and collecting in Florida. Being especially interested in Odonata, I have concentrated on these insects with the result that some species have been taken which have proved to be quite unusual and it seems that comments on them would be in order at this time. Various notes of interest are included in the following records.

PROGOMPHUS ALACHUENSIS. This species was collected very commonly during the Spring of 1939, on the sandy shores of lakes in central Florida. Of the considerable number of specimens taken, only two were females, one collected while emerging, and the other, a mature specimen caught in my hands in the woods about one-half mile from a lake.

CORYPHAESCHNA VIRENS. One female was collected on Lower Matecumbe Key, March 20, 1938, as it flew back and forth over a roadside ditch. In the hand it was quite distinct from *C. ingens,* in the greater extent of the green coloration of the thorax, as well as other slight differences. Dr. P. P. Calvert confirmed this identification.

TETRAGONEURIA SEPIA. Though some persons have doubted the validity of this species, we believe it to be quite distinctive. My first specimens, a male and female, were collected from the street in front of my home in Orlando, at least one-half mile from a lake, on March 28, 1938. Immediately we noticed differences between these and the other Tetragoneurias previously taken. We supposed them to be *sepia* and sent the male to Dr. P. P. Calvert who confirmed the identification. Now I seem to be able to identify this species before capture, especially by the slightly smaller size. Certainly when in the hand, the prominent yellowish spots of the thorax and the relatively longer inferior appendages distinguish *T. sepia* from the other members of that genus found here.

I found a dead male on a lily pad in a Winter Park lake on May 9, 1939. Mr. E. M. Davis collected a male on the west

end of the Tamiami Trail in the early part of March, 1939. In the afternoon of June 7, 1939, my father and I were collecting various small Odonata for about an hour in Nassau County at what is known as Boggy Creek. We had almost decided to leave when an unusual dragonfly appeared. I succeeded in catching it and found it to be *T. sepia*. Soon another appeared and then another, until we were swinging right and left at them. They would fly toward the collector until just out of reach of the net and stop in mid-air, often for several seconds, and then dart at great speed perhaps within a foot of the collector who would usually miss. Then the same thing would be repeated. In all the other specimens of *T. sepia* I have taken, this characteristic of hovering so long in the air has not been noticed, but the flight has been much more nervous. With a sling shot or gun that day we might have collected many more, but when we began to learn the trick of catching them with a net it became dark and we found only sixteen specimens had been taken, only one of which was a female. The following morning we returned and stayed until 9 A. M., but no more of these dragonflies appeared. Several of these specimens were presented to the Cornell collection and Dr. Needham agreed on the identification.

This year I took one male and one female at my home again on April 8 and April 21, 1940, respectively. Two females were collected April 8, 1940, at Lake Redbug in Orange County. All the specimens I have taken were collected just before dusk and were not seen at other times, but whether this denotes a tendency toward a dusk-flying habit of this species or not, I would hesitate to say.

CELITHEMIS BERTHA and FASCIATA. The first species with its characteristic red venation of the wings was found commonly on many lakes of central Florida in the Spring of 1939. Also *C. fasciata* was unusually common during the same time, being collected at almost every lake and pond visited. The spotting of the wings was found to be quite variable. In a series of specimens taken in Florida, Georgia, and North Carolina, some were found with no indication of the yellowish color in the pale areas of the wings which is so characteristic of *C.*

*fasciata*. The dark area just proximal and posterior to the nodus in the front wing in all cases extended posteriorly to $Cu_1$, and in most cases extended well beyond that vein.

LIBELLULA AURIPENNIS and JESSEANA. It has been a great pleasure, with the help of Mrs. Leonora K. Gloyd, to straighten out some of the kinks in the identification of these two species in Florida. We had formerly believed *L. auripennis* to be very abundant here and *L. jesseana* to be quite rare because of the few purplish bodied specimens of the latter species collected. We now find that *L. jesseana* is our abundant species and *L. auripennis* has certainly not been common in our collecting experience. Because of the very red hue of the stigma and wing veins of *jesseana,* as well as the difference in thoracic markings pointed out by Mrs. Gloyd, field identification is made quite easy. Farther south in the state, on Merritt's Island, and at a few other stations we have taken *auripennis,* while I have collected *jesseana* commonly on up into Georgia and North Carolina. There have probably been many errors made in the identification of specimens of these two species. Some have thought that *L. jesseana* was not a distinct species, but certainly the genitalia and thoracic pattern are very different and separation of the species is quite easy.

SYMPETRUM CORRUPTUM. We have usually found these dragonflies sparingly in Florida. Several specimens have been collected on Merritt's Island and I took one female on Sanibel Island, December 31, 1939. Mr. E. M. Davis found this species very common on the beach near Cape Canaveral in November, 1939.

LEPTHEMIS VESICULOSA. October 2-4, 1939, I was collecting shells at Sanibel and Captiva Islands. While walking down the beach on the gulf shore of Sanibel I saw what appeared to be a large female *Erythemis simplicicollis*. Then another flew by and many more were soon seen. I knew at once that I had found a good place to collect *L. vesiculosa,* but alas, I had no net, only a sling shot and cyanide jar which had been thrown in at the last minute while packing. I found however that the sling shot with coarse sand was very effective in collecting

them. They lit on the grass, sand, pen shells, etc., and were so indifferent about my presence that I began throwing sand at them and thus catching them easily. Hundreds of them were seen and about 25 collected. On December 27, 1939, I returned to Sanibel but saw only one *Lepthemis* on the gulf shore during our stay. However, on January 1, 1940, I visited the bay side of the island and found them just as abundant as they had been on the gulf shore in October; 35 were taken in a short time, males and females. This locality is much further north than the former published records from the Florida Keys.

The coloration of the specimens from Sanibel taken on the second trip varied considerably from the descriptions by Needham and Byers. They might have described from very dry specimens, but even our dry specimens appear different. The stigma, appendages of the 10th segment, the face except for a little yellow about the mandibles and labrum, the vertex, coxae and trochanters of these specimens were decidedly greenish. The tibiae and tarsi were predominantly blackish and the femora were for the most part brownish, although sometimes blackish externally or inferiorly.

MACRODIPLAX BALTEATA. We have collected this species commonly on Merritt's Island, at Titusville, Sebastian Inlet, etc., in the vicinity of brackish water along the coast. A few years ago we were very much surprised to find it on the flood plains of the St. John's River near Geneva, approximately 20 miles inland. Here there are brackish water ponds, but we wondered what path they had followed in extending their range from the coast. When Mr. E. M. Davis collected a few specimens at a brackish lake west of Mims the possibility of their having spread inland at this point became apparent. The chain of lakes from Titusville to the St. John's would furnish a possible path for this extension of range. This species was also found on Sanibel in May, 1940, as we would expect from the species found there which prefer a similar habitat.

(To be continued)

## List of Titles of Publications Referred to by Numbers in Entomological Literature in Entomological News.

1. Transactions of The American Entomological Society. Philadelphia.
2. Entomologische Blätter, red. v. H. Eckstein etc. Berlin.
3. Annales Sci. Naturelles, Zoologie, Paris.
4. Canadian Entomologist. London, Canada.
5. Psyche, A Journal of Entomology. Boston, Mass.
6. Journal of the New York Entomological Society. New York.
7. Annals of the Entomological Society of America. Columbus, Ohio.
8. Entomologists' Monthly Magazine. London.
9. The Entomologist. London.
10. Proceedings of the Ent. Soc. of Washington. Washington, D. C.
11. Deutsche entomologische Zeitschrift. Berlin.
12. Journal of Economic Entomology, Geneva, N. Y.
13. Journal of Entomology and Zoology. Claremont, Cal.
14. Archivos do Instituto Biologico, Sao Paulo.
15. Annales Academia Brasileira de Sciencias. Rio de Janeiro.
17. Entomologische Rundschau. Stuttgart, Germany.
18. Entomologische Zeitschrift. Frankfurt-M.
19. Bulletin of the Brooklyn Entomological Society. Brooklyn, N. Y.
21. The Entomologists' Record and Journal of Variation. London.
22. Bulletin of Entomological Research. London.
23. Bolletino del Lab. di Zool. gen. e agraria della Portici. Italy.
24. Annales de la société entomologique de France. Paris.
25. Bulletin de la société entomologique de France. Paris.
27. Bolletino della Societa Entomologica Italiana. Genova.
28. Ent. Tidskrift utgifen af Ent. Föreningen i Stockholm. Sweden.
29. Annual Report of the Ent. Society of Ontario. Toronto, Canada.
30. Archivos do Instituto de Biologia Vegetal, R. d. Janeiro.
31. Nature. London.
32. Boletim do Museu Nacional do Rio de Janiero. Brazil.
33. Bull. et Annales de la Société entomologique de Belgique. Bruxelles
34. Zoologischer Anzeiger, hrsg. v. E. Korschelt. Leipzig.
36. Trans. Royal Entomological Society, London. England.
37. Proceedings of the Hawaiian Entomological Society. Honolulu.
38. Bull. of the Southern California Academy of Sciences. Los Angeles.
39. The Florida Entomologist. Gainesville, Fla.
40. American Museum Novitates. New York.
41. Mitteilungen der schweiz. ent. Gesellschaft. Schaffhausen, Switzerland.
42. The Journal of Experimental Zoology. Philadelphia.
43. Ohio Journal of Sciences. Columbus, Ohio.
44. Revista chileña de historia natural. Valparaiso, Chile.
46. Zeitschrift für Morphologie und Ökologie der Tiere. Berlin.
47. Journal of Agricultural Research. Washington, D. C.
50. Proceedings of the U. S. National Museum. Washington, D. C.
51. Notulae entomologicae, ed. Soc. ent. Helsingfors. Helsingfors, Finland.
52. Archiv für Naturgeschichte, hrsg. v. E. Strand. Berlin.
53. Quarterly Journal of Microscopical Science. London.
55. Pan-Pacific Entomologist. San Francisco, Cal.
57. La Feuille des Naturalistes. Paris.
58. Entomologische Berichten. Nederlandsche ent. Ver. Amsterdam.
59. Encyclopédie entomologique, ed. P. Lechevalier. Paris.
60. Stettiner entomologische Zeitung. Stettin, Germany.

61. Proceedings of the California Academy of Sciences. San Francisco.
62. Bulletin of the American Museum of Natural History. New York.
64. Zeitschrift des österr. entomologen-Vereines. Wien.
65. Zeitschrift für angewandte Entomologie, hrsg. K. Escherich. Berlin.
67. University of California Publications, Entomology. Berkeley, Cal.
68. Science. New York.
69. Physis. Revista Soc. Argentina Cien. Nat. Buenos Aires.
70. Entomologica Americana, Brooklyn Entomological Society. Brooklyn.
71. Novitates Zoologicae. Tring, England.
72. Revue russe d'Entomologie. Leningrad, USSR.
73. Mem. Instituto Butantan. Sao Paulo, Brazil.
75. Annals and Magazine of Natural History. London.
77. Comptes rendus heb. des séances et mémo. de la soc. de biologie. Paris.
78. Bulletin Biologique de la France et de la Belgique. Paris.
79. Koleopterologische Rundschau. Wien.
82. Bulletin, Division of the Natural History Survey. Urbana, Illinois.
83. Arkiv för zoologie, K. Svenska Vetenskapsakademien i. Stockholm.
84. Ecology. Brooklyn.
87. Archiv für Entwicklungs mechanik der Organ., hrsg. v. Roux. Leipzig.
88. Die Naturwissenschaften, hrsg. A. Berliner. Berlin.
89. Zoologische Jahrbücher, hrsg. v. Spengel. Jena, Germany.
90. The American Naturalist. Garrison-on-Hudson, New York.
91. Journal of the Washington Academy of Sciences. Washington, D. C.
92. Biological Bulletin. Wood's Hole, Massachusetts.
93. Proceedings of the Zoological Society of London. England.
94. Zeitschrift für wissenschaftliche Zoologie. Leipzig.
95. Proceedings of the Biological Soc. of Washington, Washington, D. C.
97. Biologisches Zentralblatt. Leipzig.
98. Le Naturaliste Canadien. Cap Rouge, Chicoutimi, Quebec.
101. Tijdschrift voor entomologie. Nederland. Ent. Ver., Amsterdam.
102. Entomologiske Meddelelser, Entomologisk Forening, Copenhagen.
103. Journal of the Kansas Entomological Society, Lawrence, Kansas.
104. Revista de la Sociedad entomologica Argentina, Buenos Aires.
105. Revista de Entomologia, Rio de Janeiro, Brazil.
106. Anales Sociedad Cientifica Argentina, Buenos Aires.
107. Proc., Royal Entomological Society, London.
108. Revista, Col. Nac. Vicente Rocafuerte, Guayaquil.
109. Arbeiten uber morpholog. und taxonom. ent. aus Berlin-Dahlem.
110. Arbeiten ueber physiolog. u. angewandte ent. aus Berlin-Dahlem.
111. Memorias do Instituto Oswaldo Cruz. Rio de Janeiro.
112. Anales del Instituto de Biologia Mexico.
114. Occasional Papers of the Museum of Zoology, University of Michigan.
115. Memorias de la Soc. Cubana de Hist. Nat. Havana, Cuba.
116. Parasitology. Ed. Keilin and Hindle. London.
117. Microentomology, Stanford University.
118. Ward's Ent. & Nat. Sci. Bull., Rochester, N. Y.
119. American Midland Naturalist, Notre Dame, Ind.
120. The Great Basin Naturalist, Provo, Utah.
121. Ciencia, Mexico City.
122. Revista Museo de la Plata, Buenos Aires.
123. Indian Journal of Entomology, New Delhi.

# Current Entomological Literature

COMPILED BY V. S. L. PATE, L. S. MACKEY and E. G. FISHER.

Under the above head it is intended to note papers received at the Academy of Natural Sciences of Philadelphia pertaining to the Entomology of the Americas (North and South), including Arachnida and Myriopoda. Articles irrelevant to American entomology will not be noted; but contributions to anatomy, physiology and embryology of insects, however, whether relating to American or exotic species will be recorded.

This list gives references of the current or preceding year unless otherwise noted. All continued papers, with few exceptions, are recorded only at their first installment.

For records of Economic Literature, see the Experiment Station Record, Office of Experiment Stations, Washington. Also Review of Applied Entomology, Series A, London. For records of papers on Medical Entomology, see Review of Applied Entomology, Series B.

Note. References to papers containing new forms or names not so stated in titles are followed by (*); if containing keys are followed by (k); papers pertaining exclusively to neotropical species, and not so indicated in the title, have the symbol (S) at the end of the title of the paper.

The figures within brackets [ ] refer to the journal in which the paper appeared, as numbered in the list of Periodicals and Serials published in our January and June issues. This list may be secured from the publisher of Entomological News for 10c. The number of, or annual volume, and in some cases the part, heft, &c., the latter within ( )follows; then the pagination follows the colon :

Papers published in the Entomological News are not listed.

GENERAL.—**Anduze, P. J.**—Un proyecto de estudio de la fauna entomologica Venezolana. [Bol. Soc. Venezolana Cien. Nat.] 6: 238-248. **Armbruster, L.**—Eine miocaene Insektenfauna (mit meinem Praparierverfahren). [Verh. VII Internat. Kongr. Ent. Berlin] 2: 1365-1371. **Aubrook, E. W.**—The preparation of models of the heads and tracheal system of insects. [Mus. Jour., London] 40: 223-225, ill. **Beall, G.**—The fit and significance of contagious distributions when applied to observations on larval insects. [84] 21: 460-474. **Blackwelder, R. E.**—Some aspects of modern taxonomy. [6] 48: 245-257. **Carpenter, G. D. H.**—Birds as enemies of butterflies, with special reference to mimicry. [Verh. VII Internat. Kongr. Ent. Berlin] 2: 1061-1074, ill. **Chapman, R. N.**—Insect population problems in relation to insect outbreak. [Ecol. Monogr.] 9, (1939): 261-269. **Eichler, W.**—Geographische und okologische Probleme bei ektoparasitischen Insekten. [Verh. VII Internat. Kongr. Ent. Berlin] 2: 1089-1096. **Emerson, A. E.**—Populations of social insects. [Ecol. Monogr.] 9, (1939): 287-300. **Fall, H. C.**—Obituary and bibliography by P. J. Darlington. [5] 47: 45-54, ill. **Fichter, E.**—An ecological study of Wyoming spruce-fir forest Arthropods with special reference to stratification. [Ecol. Monogr.] 9: (1939): 185-215, ill. **Fiebrig, C.**—Skizzen aus dem Insektenleben in Paraguay. [Verh. VII Internat. Kongr. Ent. Berlin] 2: 1097-

1105, ill. **Gerhardt, U.**—Ueber die biologische bedeutung der lautäusserungen einiger insekten. [Forsch. & Fortsch.] 16: 291-292. **Gibson, A.**—The Canadian Entomological Service; 50 years of Retrospect, 1887-1937. [Verh. VII Internat. Kongr. Ent. Berlin] 3: 1429-1479. **Graham, S. A.**—Forest insect populations. [Ecol. Monogr.] 9, (1939): 301-310. **Griffin, F. J.**—The first entomological societies. An early chapter in entomological history in England. [107] A, 15: 49-68. **Hoffmann, W. H.**—Das Finlay-Institut und die Gelbfiebermucke. [Verh. VII Internat. Kongr. Ent. Berlin] 3: 1589-1603, ill. **Hungerford, H. B.**—Results of the Oxford University Cayman Islands Biological Expedition of 1938. [8] 76: 255-256. **Janse, A. J. T.**—Glimpses of the development of entomological science in South Africa. [J. Ent. Soc. So. Afr.] 3: 1-8, **King, K, M,**—Population studies of soil insects [Ecol. Monogr.] 9, (1939): 270-286. **Lounsbury, C. P.**—The pioneer period of economic entomology in South Africa. [J. Ent. Soc. So. Afr.] 3: 9-29. **Park, O.**—Nocturnalism—The development of a problem. [Ecol. Monogr.] 10: 486-536. **Sakimura & Linford.**—An annotated list of insects from Lanai (Hawaiian Ids). [37] 10: 451-454. **Savely, H. E., Jr.**—Ecological relations of certain animals in dead pine and oak logs. [Ecol. Monogr.] 9, (1939): 323-385, ill. **Schmidt, E.**—Libellen als Objecte der angewandten Entomologie. [Verh. VII Internat. Kongr. Ent. Berlin] 3: 1494-1505, ill. **Schuhardt, V. T.**—A "tictorium" for the propagation of a colony of infected Ornithodoros turicata. [Jour. Parasit.] 26: 201-206, ill. **Sellnick, M.**—Milben als Parasiten von Insekten. [Verh. VII Internat. Kongr. Ent. Berlin] 2: 1300-1307, ill. **Silvestri, F.**—Importanza dell 'entomologia nell' economia mondiale. [Verh. VII Internat. Kongr. Ent. Berlin] 3: 1506-1522. **Smith, C. C.**—Biotic and physiographic succession on abandoned eroded farmland. [Ecol. Monogr.] 10: 422-484. **Smith, H. S.**—Insect populations in relation to biological control. [Ecol. Monogr.] 9, (1939): 311-320, ill. **Smith, R. H.**—Modified Riker insect mount for use in teaching. [4] 72: 209-211, ill. **Ulrich, H.**—Uber den generationswechsel und seine bedingungen. [Die Naturwissensch.] 28: 569-576, ill., cont. **Van Duzee, E. P.**—The life and works of, by Essig & Usinger. [55] 16: 145-177, ill. **Weidner, H.**—Die Grossstadt als Lebensraum der Insekten, ihre Biotope und ihre Besiedlung. [Verh. VII Internat. Kongr. Ent. Berlin] 2: 1347-1361, ill. **Weiss, H. B.**

—Money losses due to destructive insects. [6] 48: 195-199. **Wille, J. E.**—Landwirtschaftliche Entomologie in Peru und angrenzenden Landern Sudamerikas. [Verh. VII Internat. Kongr. Ent. Berlin] 3: 1523-1539. **Williams, C. B.**—The numbers of insects caught in a light trap at Rothhamsted during four years, 1933-37. [107] A, 15: 78-80.

**ANATOMY, PHYSIOLOGY, ETC.—Andre, M.**—Sur l'allotrophie chez les Acariens. [Verh. VII Internat. Kongr. Ent. Berlin] 2: 1009-1023. **Barbieri, N. A.**—L'ampoule articulee des Dipteres (balancier), organe de respiration et de direction du vol. [Verh. VII Internat. Kongr. Ent. Berlin] 2: 628-629, ill. Les crustaces et les insectes ne possedent pas d'yeux composes ou le systeme oculaire dans l'echelle zoologique. [Verh. VII Internat. Kongr. Ent. Berlin] 2: 630-652, ill. **Baumann, C.**—Ueber den Legeapparat von Baryconus rufipes (Hym., Proct.). und seine Beziehungen sum Abdominalhocker. [Verh. VII Internat. Kongr. Ent. Berlin] 2: 653-666, ill. **Berg, V. L.**—The external morphology of the immature stages of the bee fly Systoechus vulgaris (Dipt.: Bombyliid.), a predator of grasshopper egg pods. [4] 72: 169-178, ill. **Buchmann & Sydow.**—Weitere Versuche an Drosophila melanogaster uber den Einfluss von Schwermetallsalzen auf die Mutationsauslosung durch Rontgenstrahlen. Versuche mit Uranylacetat. [97] 60: 137-142. **Campau, E. J.**—The morphology of Chauliognathus pennsylvanicus (Coleo: Cantharid.). [Microent.] 5: 57-90, ill. **Catala, R.**—Variations experimentales de l'Urania de Madagascar (Lep.) [Verh. VII Internat. Kongr. Ent. Berlin] 2: 667-672, ill. **Clark, H. W.**—The adult musculature of the Anisopterous dragonfly thorax (Odonata). [J. Morph.] 67: 523-565, ill. **Cope, O. B.**—The morphology of Psocus confraternus. [Microent.] 5: 91-115, ill. **Cumley, R. W.**—Comparison of serologic and taxonomic relationships of Drosophila spp. [6] 48: 265-274, ill. **Dallas, E. D.**—Coexistencia de dos Monstruosidades en un Coleoptero. [Verh. VII Internat. Kongr. Ent. Berlin] 2: 673-677, ill. Coleopteros que originan Dermatitis en la Republica Argentina. [Verh. VII Internat. Kongr. Ent. Berlin] 2: 678-682. Un Lepidoptero ginandromorfo. [Verh. VII Internat. Kongr. Ent. Berlin] 2: 683-684, ill. **Dutky & White.**—Note on the occurrence of microsporidian infection among native Scarabeid larvae. [Jour. Parasit.] 26: 333. **Ebner, R.**—Einige teratologische Naturfunde bei Orthopteren. [Verh. VII Internat. Kongr.

Ent. Berlin] 2: 685-688, ill. **Eggers, F.**—Zur biologischen Bedeutung der Flugelfarbung tagfliegender Lepidopteren (Filmvorfuhrung). [Verh. VII Internat. Kongr. Ent. Berlin] 2: 689-693. Phyletische Korrelation bei der Flugelreduktion von Lepidopteren. [Verh. VII Internat. Kongr. Ent. Berlin] 2: 694-711. **Fahlander, K.**—Die segmentalorgane der Diplopoda, Symphyla und Insecta Apterygota. [Zool. Bidrag Uppsala] 18: 243-251, ill. **Ferris, G. F.**—The myth of the thoracic sternites of insects. [Microent.] 5: 87-90. **Gilmour, D.**—The anaerobic gaseous metabolism of the roach, Cryptocercus punctulatus. [92] 79: 297-308. **Gunther, K.**—Beitrag zur Kenntnis der Fortpflanzungsbiologie der Stabheuschrecke Orxines macloffi (Orth. Phasmid.). [Verh. VII Internat. Kongr. Ent. Berlin] 2: 1156-1169, ill. **Heikertinger, F.**—Uber den derzeitigen Stand der Mimikryfrage und der Tiertrachtfragen im allgemeinen. [Verh. VII Internat. Kongr. Ent. Berlin] 2: 712-739. **Herter, K.**—Uber den Temperatursinn der Insekten [Verh. VII Internat. Kongr. Ent. Berlin] 2: 740-759, ill. **Hilton, W. A.**—Nervous system and sense organs: LXXXIII.—Hymenoptera. [13] 32: 41-56, ill. **Hoskins, W. M.**—Recent contributions of insect physiology to insect toxicology and control. [Hilgardia] 13: 307-386. **Kardakoff, N. I.**—Geschlechts-Witterung im Raupen Stadium bei Depressaria sp. (Lep.). [Verh. VII Internat. Kongr. Ent. Berlin] 2: 1172-1180. **Koch, A.**—Uber den gegenwartigen Stand der experimentellen Symbioseforschung. [Verh. VII Internat. Kongr. Ent. Berlin] 2: 760-771, ill. **Krause, G.**—Neue Erkenntnisse uber die verschiedenen Eitypen der Insekten und ihre Bedeutung fur Entwicklungsphysiologie und Systematik. [Verh. VII Internat. Kongr. Ent. Berlin] 2: 772-779, ill. **Kuhn, A.**—Zur Entwicklungsphysiologie der Schmetterlingsmetamorphose. [Verh. VII Internat. Kongr. Ent. Berlin] 2: 780-796, ill. **Kuhnelt, W.**—Beitrage zur Kenntnis des Wasserhaushaltes der Insekten. [Verh. VII Internat. Kongr. Ent. Berlin] 2: 797-807. **Lederer, E.**—Les pigments des invertebraes (a l'exception des pigments respiratoires). [Biol. Revs.] 15: 273-306, ill. **Lederer, G.**—Zur Fortpflanzungsbiologie (Paarung) der Gonepterix-Arten (Lep.). [Verh. VII Internat. Kongr. Ent. Berlin] 2: 808-813, ill. **Long, M. E.**—Study of the nuclear and cytoplasmic relationship in Scyllina cyanipes (Orth.). [J. Morph.] 67: 567-607, ill. **Ludtke, H.**—Funktionelle Bedeutung der Differenzierungen im Auge des Ruckenschwim-

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**SPECIAL NOTICES.—Vegetation type maps** of California and western Nevada. By A. E. Wieslander. Univ. of Calif. Press, Berkeley, California. 1932.

## OBITUARY

The *Philadelphia Inquirer* for October 10, 1940, carried a dispatch from Bedford Hills, New York, of the preceding day, that MISS KATHERINE MAYO, best known for her book "Mother India," 1927, died at her home that day after a long illness, at the age of 72. She was born in Ridgeway, Pennsylvania.

Miss Mayo spent five years in Surinam extending into 1906. Among the letters which Dr. Henry Skinner left at the Academy of Natural Sciences of Philadelphia are some from Miss Mayo and her sister, Miss Gertrude Mayo, of the years 1906 and 1907, referring to insects which she sent for the Academy. In her letter from Paramaribo of May 22, 1906, she mentions that she had sent ten boxes by consecutive mails since March 29; "All the insects in these boxes have been caught here in Paramaribo or in the brush of the immediate outskirts." After her return to the United States, she placed an advertisement in the *News* for June and July, 1907: "Surinam insects for sale—Apply to Katherine Mayo, Frankford

Arsenal, Philadelphia, Pa." It was of this that she wrote from Locust, New Jersey, August 22, "I have as many answers, now, as I have insects for; so it may be as well to discontinue the advertisement." Previously, on July 6, 1907, she wrote of a visit to the Academy which "makes me wonder if by any chance there might be a place in the Academy that I could apply for." Dr. Skinner's reply, not at hand, brought the letter of August 22: "I should have liked working at the Academy, but as you say and show, the conditions are not exactly practical."—P. P. CALVERT.

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We regret to notice in recent numbers of *Science* announcements of the deaths of the following biologists interested in entomology:

Dr. OTTO EMIL PLATH, professor of biology at Boston University, on November 5, 1940, in his fifty-sixth year. His papers and book on the biology of bumble bees are well known.

Miss GRACE ADELBERT SANDHOUSE, of the U. S. Bureau of Entomology and Plant Quarantine, specialist in identification of bees and wasps, on November 9, 1940, aged forty-four years. Her memoir on the North American Bees of the genus *Osmia* was reviewed in the *News* just a year ago.

Dr. JOHN PATTILLO TURNER, assistant professor of zoology at the University of Minnesota, on November 11, 1940, in his thirty-ninth year. A paper on the black widow spider in a Minnesota winter was contributed by him to the *News* for December, 1939.

Dr. F. W. EDWARDS, since 1937 deputy keeper of entomology at the British Museum of Natural History, on November 15, 1940, at the age of forty-six years. He was well-known for his work on the Diptera, especially the Nematocera, and was joint leader of the British Museum Ruwenzori Expedition of 1934-35 to the high mountains of British East Africa.

Prof. CHARLES WILLIAM WOODWORTH, emeritus professor of entomology at the University of California, on November 19, 1940, in his seventy-sixth year. An obituary notice by E. O. Essig is in *Science* for December 20, 1940. He had recently been elected an honorary fellow of the Entomological Society of America.

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# Notes on Florida Odonata.

By M. J. WESTFALL, JR., Baker Museum, Rollins College, Winter Park, Florida.

(Continued from page 18)

TRAMEA LACERATA. While at Sanibel from December 27, 1939, to January 1, 1940, I saw two mating pairs and one single male of *T. lacerata*. The single specimen remained around the camp for two days and could have been collected if the sling shot had not broken. After having collected this species during the summer in North Carolina, there was no difficulty in identifying it in the field, as the general black coloration is very distinct.

ARGIA BIPUNCTULATA. This species had been very uncommon in our collection until the Spring of 1939. During the previous Spring I found a few at a roadside ditch in Orange County and collected 17 specimens on April 24, 1938. On May 13, 1939, over a hundred specimens, both male and female, were taken in a marshy area surrounding a very small pond which was nearly dry and not more than fifty feet across. Later many more were seen in the same place. In another similar locality about ten miles distant they were also found on May 14, but only a few were seen. Spaghnum moss seemed to be characteristic of the localities where this species occurred.

ARGIA TIBIALIS. In central Florida this damselfly has been very rare in our experience. We have collected only one male in this vicinity, this being taken April 4, 1937, in Seminole County. In Nassau County, however, it was one of the commonest of the Zygoptera in the summer of 1939, being common everywhere I collected.

ENALLAGMA DURUM. On the flood plains of the St. John's River many of these large *Enallagmas* have been collected. For this part of the state, this is our only locality record except for a single male which I collected on a lake in Winter Park. In May, 1939, I visited the above mentioned plains and found *E.*

*durum* very common on a large Indian mound. There was a strong breeze blowing and they were found around thorn bushes which grew on the mound, and stayed on the side away from the wind. By going from one thorn bush to another more than a hundred of these Enallagmas were collected in a short time, one swing of the net catching three of them on several occasions.

E. LAURENTI. In the late afternoon of November 15, 1939, a friend and I collected *E. laurenti* on a Winter Park lake from a canoe, using swatters almost entirely. These damsels were so common on the lily pads that four times as I struck at one another appeared so that two were taken at one swat. In a little over an hour we took 90 specimens, all but one of which were males.

E. SULCATUM. A number of collectors have been quite delighted to receive this species from us. Certainly it is one of our commonest Enallagmas here, since in an afternoon it is no task to collect over a hundred around one small lake while collecting various other species.

E. POLLUTUM and SIGNATUM. We have found since the paper on "Odonata at Winter Park, Florida," by E. M. Davis and J. A. Fluno was published in 1938, that our common *Enallagma* here is *E. pollutum*. Around the lakes and on the Wekiwa River they are abundant most of the year. Only about five specimens of *signatum* have been taken here. In Nassau County, a little more than 150 miles north of us, this situation seems to be reversed, and while catching several hundred *signatum* which fairly swarmed over the water at Boggy Creek and elsewhere, very few specimens of *pollutum* were taken.

E. DUBIUM. Also in Nassau County while making a swoop for an *E. weewa,* a male of *E. dubium* came along just in time to be caught in the net. On June 7, 1940, I collected three more males at this same station. On September 11, 1940, a number of males were collected, as well as four mating pairs. Females were found just emerging. On the previous day I stopped at Satilla Creek in Bacon County, Georgia, where I

had taken a pair of *dubium* a year earlier. At about 9:30 A. M., I began searching for this species. About an hour later the males began to appear, but were not collected. Then about noon the females began appearing, and the pairs in tandem began alighting on floating vegetation where the females deposited the eggs. Sixteen pairs were quite easily taken. The place where this species was found was along the roadside ditch into which Satilla Creek backs. The creek is bordered by a swampy area with a number of cypress trees in sight. The water is quite deep and dark.

E. CONCISUM. This brilliant red and black damselfly has been uncommon here in the past, but was collected at almost every lake visited in Central Florida during the Spring and Fall of 1939. Certainly it was far from being uncommon, especially at the lakes with dead grass extending out into the water for some distance. They seemed to like to stay on this grass as far from the shore as possible, so that one usually waded in the water to collect them. Some were also collected in Nassau County.

E. WEEWA. In March, 1935, one male of this species was collected on the Wekiwa River by Mr. E. M. Davis. Then I took another male in the same locality in May, 1939. No other specimens were taken by us until September 13, 1939, when I found them very abundant at certain points in Nassau County. They were first found at a small stream about five miles south of the Florida-Georgia state line. Also I collected them at a stream on the Nassau-Duval County line. Over 100 specimens, male and female, were taken in a short time. Three males were also collected in the same place on June 7, 1940. The streams where *E. weewa* was so abundant were small, flowing through low woods, which were overflowed by high water. The bottom was sandy, and the water quite dark, forming deep pools in some places. Over these pools *E. weewa* hovered as if motionless, then moved leisurely up and down the extent of the pool, hesitating here and there in mid-air. *E. cardenium* was present and at first was confused with *weewa,* but soon could be distinguished from the latter by the heavier build of the body and different flight. I believe *E. weewa* may be more

common on the Wekiwa than the two records indicate, but that the few individuals are lost in the host of *cardenium*.

Teleallagma (Enallagma) daeckii. We have never taken this species in central or southern Florida, but on June 7, 1940, I collected nine mating pairs in Nassau County. They were all taken at one station, in a grassy area at the edge of a creek which was almost dry.

Ischnura kellicotti. With a swatter this species is taken in large numbers on the local lakes, where it flies from one lily pad to another with a quick, nervous movement unlike that of any other of the Zygoptera with which I am familiar. Almost every lake with lily pads had its share of them during the Spring and Fall of 1939, males, and both homochromatic and heterochromatic females. In a couple hours to collect a hundred specimens of *I. kellicotti*, together with additional specimens of other species, was not a difficult task with a swatter at one lake where I collected.

## A Synonymical Note on Crabro (Blepharipus) davidsoni Sandhouse (Hymenoptera, Sphecidae: Pemphilidini).

During a recent visit to the Museum of Comparative Zoölogy at Cambridge, Mr. Nathan Banks called my attention to a species he described in 1921 as *Blepharipus parkeri* (Ann. Ent. Soc. Amer., XIV, p. 17), and inquired if it was not the same as that which Miss Grace A. Sandhouse named *Crabro (Blepharipus) davidsoni* in 1938 (Ann. Ent. Soc. Amer., XXXI, p. 1). Comparison of the type of Banks' *parkeri*, described from a series of females taken at Lexington, Massachusetts, with material of *Crabro (Blepharipus) davidsoni*, indicates that the two are indubitably one and the same species. Miss Sandhouse's name must therefore be recorded as a synonym of Banks' earlier *Blepharipus parkeri*. *Crossocerus (Blepharipus) parkeri* (Banks), which nests in old stumps and rotting logs, provisioning its galleries therein with a diverse assortment of leafhoppers, is a rather common and widely distributed form throughout the New England, Middle Atlantic, and North Central states. Davidson, for whom Miss Sandhouse named the species, and Landis presented an excellent account of its biology in 1938 (Ann. Ent. Soc. Amer., XXXI, pp. 5-8).—V. S. L. Pate, Cornell University.

# New Genera and Species of North American Ephydridae (Diptera).

By EZRA T. CRESSON, Jr., Associate Curator, Dept. of Insects, The Academy of Natural Sciences of Philadelphia.

**Discocerina flavipes** new species.

Whether this is a variety or subspecies of *obscurella,* or a distinct species, is difficult to determine at present. Its similarity to the Neotropical *nitidiventris* Hendel, the narrow-cheek form of *obscurella,* is apparent, differing only, it seems, in having the legs entirely yellow. In all the material I have seen of *obscurella* from North America, the femora are dark with at most their apices showing some dilution. In the present form the legs, including the coxae, are entirely yellow, although the femora may show some infuscation on the posterior surfaces. In other respects the characters are those of that form of *obscurella* with narrow parafacies and cheeks.

Very similar to *obscurella* but the legs mostly yellow; parafacies very narrow and conspicuously pale and show little or no dilatation ventrad. Tergite V of the male seems to be no more shining than IV and is sometimes not at all shining.

*Type.*—♂; Bakersfield, CALIFORNIA, September 4, 1898; [A. N. S. P., no. 6607][1]. *Paratypes.*—2 ♂, 1 ♀; with same data.

## HELAEOMYIA new genus.

*Genotype*: *Psilopa petrolei* Coquillett, 1898.

This interesting insect, the "Petroleum fly," cannot well be retained in *Psilopa,* nor will it more comfortably go in *Mimapsilopa* Cresson nor *Clasiopella* Hendel.

The face is somewhat gently convex and bifoveate, with two rather stout facials on each side, occupying the lower third of facial profile. The antennal spine is short and the third segment but slightly elongate and not conoid.

**Helaeomyia californica** new species.

Very similar to the European *Psilopa nitidula* (Fallen) in the color pattern of the legs, but the strong general setation and the strong second facial, places it near *Psilopa dimidiata* (Cresson), another member of the genus.

[1] This material was given me by Dr. C. W. Woodworth of the University of California, in 1908.

Fore legs entirely black; antennae black with base of third segment slightly diluted. Yellow: apices of mid and hind femora, entire mid and hind tibiae and their tarsi except apices. Halteres white. Wing slightly dusky with some veins pale; posterior crossvein distinctly clouded. Shining, without any metallic reflections.

Setation strongly developed. Head broader than high; distinctly higher than long. Fronto-facial profile rather straight, oblique from anterior ocellus to mid face, with vertex rounded; Frons about .6 width of head, twice as broad as long; ocellars about as far apart as are the posterior ocelli; frontorbital aligned with frontal and well removed mesad. Face about .3 width of head, scarcely twice as long as broad; rather strongly convex but not gibbous in profile; foveal sulci slightly indicated; upper facial almost at mid profile, cruciate; second bristle one-half as long; one to two setae ventrad. Cheek about as broad as third antennal segment; buccal very long. Antennal spine as long as third segment; arista with six hairs.

Mesonotal setulae rather distinctly seriated; prescutellar rectangle, quadrate. Scutellum flat. Abdomen elongate-ovate; tergite V of male not longer than IV; genital segment well developed.

Fore coxae with weak lateral marginal setae; fore femur minutely serrulated on antero-flexor margin. Vein II but slightly curving into costa; second costal section slightly longer than third.

Length, 2 mm.

*Type.*—Male; Davis, CALIFORNIA; June 9, 1936; (R. M. Bohart; sweeping lawn grass); [A. N. S. P., no. 6608][2].

*Paratypes.*—1 female; with same data. 1 ♀; Eldridge, Sonoma County, California; October 25, 1915; (J. A. Kusche).

## MIMAPSILOPA new genus.

*Genotype*: *Clasiopella metatarsata* Cresson, 1939.

Much like the Indo-Malayan *Clasiopella* Hendel, 1914, in the form of the antennae, but the arrangement of the facials simulates that of *Helaeomyia* Cresson and in this respect approaches *Leptopsilopa.*

Strongly setose species with long antannal spine and conoid third segment. Face distinctly convex medianly, the facials well separated and occupying the lower half or three-fifths of

[2] This type was placed in the Collection of the Academy by Dr. A. L. Melander.

the facial profile.

**Hydrellia bergi** new species.

Very similar to *H. subnitens* Cresson, 1931 in possessing such a conspicuous genital segment, but it has the legs including the tarsi, entirely black.

Black, including antennae and tarsi; palpi and genital segment, orange or yellow. Halteres lemon yellow. Wings with black veins.

Frons almost opaque black, its areas but slightly differentiated. Face sericeous, yellow to golden; lunule more whitish; cheeks and occiput cinereous. Mesonotum including humeri and notopleura and scutellum, black with very sparse gray or brownish vestitum, almost shining; pleura cinerous especially ventrad but becoming darker dorsad and on metanotum. Abdomen opaque black, becoming more shining and sparsely cinerous laterad and apicad; ventral lobes cinereous. Legs somewhat cinereous

Head scarcely broader than high. Frons strongly transverse; ocellars rather weak. Face more than one-fourth width of head, about twice as long as broad, evenly convex in profile, not definitely carinate; facial series of about six fine bristles, extend well dorsad; parafacies linear almost to postbucca. Cheeks about as broad as third antennal segment. Arista with about six hairs.

Mesonotal bristles and setulae rather well developed and the latter not numerous; antesutural dorsocentral about as strong as postsutural one with an intermediate seta, and a second postsutural dorsocentral sometimes well developed. Abdomen ovate; tergites III to V of male long, subequal in length, the latter trigonal; genital segment large, always visible, the large pale protegen being most conspicuous.

Legs slender with rather strong setation. Wings elongate, with costa II not much longer than III.

Length, 2.2 mm.

*Type.*—Male; Nigger Creek, Cheboygan County, MICHIGAN; June 27, 1940; (C. C. Berg); [U. S. N. M.]. *Paratypes.*—1 ♂; 1 ♀; Douglas Lake, Cheboygan Co., Michigan; July 5, 1940; (C. C. Berg). 1 ♀; Cheboygan County, Michigan, June 25, 1940; (C. C. Berg).

**Hydrellia johnsoni** new species.

Very similar to *H. tibialis* Cresson, 1917, but entirely opaque

to subopaque. The frons uniformly opaque, almost velvety-black, but the mesofrons sometimes slightly differentiated in extreme dorsal aspect. Antennae entirely opaque black. Mesonotum, scutellum and abdomen concolorous, almost truly opaque, with tendency to gray or brownish; pleura more cinereous, as are also the coxae. Second costal section slightly longer than third.

*Type.*—Male; New Mill Pond, Mt. Desert, MAINE; July 25, 1935; (William Procter); [Acad. Nat. Sci. Phila., no. 6609].[8] *Paratypes.*—8 ♂, 6 ♀; with same data.

## Ants Preying on Termites (Hymen.: Formicidae; Isoptera: Rhinotermitidae).

In spite of the ease with which the capture of swarming termites by ants might, supposedly, be observed, there seems to be only one record extant for North America This is of an unnamed species taken in Louisiana by *Iridomyrmex humilis.*

This spring at Lincoln, Massachusetts, I was able to observe the following six ants taking alates of *Reticulitermes flavipes*: *Crematogaster lineolata, Aphaenogaster fulva acquia, Lasius niger alienus* var. *americanus, Formica rufa integra, F. neogagates,* and *F. pallidefulva nitidiventris.* This is, so far, the roll of termitharpactic ants in North America.

Wheeler (1936, Proc. Amer. Acad. Arts Sci., *71*: 159-243) has excellently summarized the ecological relations of ants to termites. On pp. 178 and 179 he distinguishes five relationships: (1) termitharpagy or predation, (2) cleptobiosis or theft of termite prey from termitharpactic ants, which is really an ant to ant relationship, (3) lestobiosis or theft of termite brood by ants, (4) plesiobiosis or utilization of termitaries by ants, (5) termitoxeny or friendly residence in the termite-inhabited part of the termitary. Termitharpagy has been considered and cleptobiosis is not yet recorded for this continent. Wheeler lists four North American termitolestic ants. His fourth category is represented in North America by, at least, an occasional colony of *Crematogaster lineolata* and probably of *Camponotus castaneus americanus.* Termitoxenic ants are not known in the New World.—CHARLES H. BLAKE, Massachusetts Institute of Technology, Cambridge, Mass.

[8] The type of this species has been placed in the Academy's Collection by Mr. Procter.

# Further Notes on the Snail-collecting Aphis-lion Larva (Neuroptera: Chrysopidae).

By DAVID T. JONES, M.S., Ph.D., Associate Professor Zoölogy, University of Utah.

## IDENTIFICATION, DISTRIBUTION AND SNAILS CARRIED.

Recently Dr. Roger C. Smith of Kansas State College, has examined the wing-venation of the snail-collecting aphis-lion, the larva of which has been previously described (Jones, 1929). He has tentatively identified it as *Nodita virginica* (Fitch). The specimen was collected two miles north of Bloomington, Indiana, but was in the pupal stage. After some time the adult emerged and the wings were mounted. These were later photographed by Calvin A. Richins of the University of Utah.

In addition to the above, I am indebted to the following for aid in the study of this species: Prof. H. R. Eggleston, Dr. R. G. Guthrie, Roy Ash, Ralph Alexander, and Paul Crone of Marietta College, Ohio; Adrienne Satterfield (now Mrs. Huston Newman) of West Union, Ohio; Dr. Fernandus Payne and Dr. A. C. Kinsey of Indiana University; Dr. Carl J. Drake and Dr. E. R. Becker of Iowa State College; Dr. R. V. Chamberlin and Dr. Don M. Rees of the University of Utah; and the officials of the Smithsonian Division of the Library of Congress, Washington, D. C.

Historically, the first mention that I have found of such a snail-carrying aphis-lion larva is that of Banks (1905) who erroneously placed it in the Hemerobiid, rather than in the Chrysopid family, as Smith (1926) later confirms. No locality record was given. I quote this first mention by Banks. "The larvae of *Hemerobius* appear to be much less known than allied forms; I have not bred any, but a larva given me by Mr. Schwarz probably belongs to this genus; it has a broader head, a shorter body than *Chrysopa;* and the lateral processes of the thorax are very long; this specimen was taken among fallen leaves and carried the empty shells of several small molluscs." Smith (1926) lists no snail-carrying larvae in his very fine discussion of trash-carrying Chrysopid larvae. The author (1929) described the external features of the larva now

under consideration, giving two localities: Vinton County, Ohio, approximately seven miles west of Albany, which is about twelve miles east of McArthur; and Squaw Hollow, near Marietta, Ohio. The numbers, unreported therein, were from these localities respectively: five, which were preserved; and one, which escaped. Subsequent to this publication one more living specimen was taken at Squaw Hollow. Observations have recently been made (Archer, 1938) on a similar Chrysopid, perhaps not the same species, in North Carolina and Alabama. He found only four specimens, one from each of the following four localities: Hayesville, North Carolina; Robbinsville Road in the northwest of Macon County, North Carolina; Clay, Jefferson County, Alabama; and Fort Payne, DeKalb County, Alabama. Archer reports the following species of snails carried: *Retinella indentata paucilirata, Retinella indentata carolinensis wetherbyi, Polygyra rugeli* juveniles, *Hawaiia minuscula, Euconulus sterkii, Euconulus chersinus,* and *Vertigo gouldii.* Two insect crania were also listed. As this paragraph contains all the literature resulting from a search of over ten years, it is evident that the literature is as meager, as the specimens are rare.*

During this time, however, the following locality records have accumulated for this species: Athens County, Ohio, midway, between Torch and Coolville, five live specimens and two dead specimens; Meigs County, Ohio, two miles northeast of Rock Springs, near Chester, one live specimen; Morgan County, Ohio, on Turkey Run, one mile west of Stockport, one pupal case with snails intact, from which the adult insect had emerged; Adams County, Ohio, at Hill's Fork on the Panhandle Road, one living specimen; and Bloomington, Indiana, two live specimens, and one pupa from which the adult emerged, the wings of which are mentioned above.

The snails carried on the Ohio and Indiana specimens are of the following species: *Punctum pygmaeum* (Drap.), *Euconulus*

* Since this paper was submitted, Dr. Roger C. Smith has called attention to my overlooking the article by Gordon K. MacMillan. January, 1939, A snail. "taxi." Naut. Vol. 52, No. 3, pp. 94-95. He thinks that the specimens Mr. MacMillan has are "unquestionably Chrysopid" rather than Hemerobiid.

*fulvus* (Müller) *Striatura milium* (Morse); *Carychium exiguum* (Say), *Strobilops labyrinthica* (Say), and *Cochlicopa lubrica* (Müller). The first two seem to be favorites, as they are chosen far more often than the proportion in which these species occur in the natural fauna. Fragments of insect skeletons are also often used.

BEHAVIOR, LOCOMOTION, TROPISMS AND FEEDING.

The following observations on behavior chiefly of the Athens County specimens are submitted. Animals mechanically prodded "play possum", recovering in from ten to fifteen seconds if undisturbed. In walking there is a peculiar "feeling" or exploratory movement every few steps by the piercing spears. The animals at room temperature attained the following speeds in walking for thirty second periods: 11 cm. (including stops), 10 cm. (including stops), 16 cm., 16 cm., and 16 cm. The last three were non-stop promenades. While the leg action is ordinary (the first and third femora on one side moving in the same direction, while the second on the same side is moving in the opposite direction), they have a "hitching" stride. The spears can be approximated, and frequently are, when the animal stops. The animal stops "jeep-like", with head down and flattened against the table, the hind legs elevated thus raising the abdomen.

When turned over on their backs, they somersault to regain the upright position instead of turning sidewise. Sometimes they somersault spears first. At other times they recover by placing the last pair of legs down first and then flopping over.

They dislike excess moisture. They prefer a rather dry habitat of dead leaves. They choose dry instead of wet or moist surfaces. When placed in the light they turn and travel in the other direction. The more intense the light, the faster they travel, seeking darkness or at least shade. They respond negatively to heat, avoiding the warm dry hand or finger. They travel with equal facility on all inclines. They travel as easily vertically downward as vertically upward. When a vertical plane is placed at right angles to their course, they go up over it, rather than crawling along the junction of the plane with the table. In this they appear to be negatively thigmotropic,

unlike the positively thigmotropic trash-carrying Chrysopid larvae reported by Smith (1926). However, under certain circumstances, there is positive thigmotropism. They tend to wedge into crevices. Also they are very uncomfortable when divested of their cloak of shells, as described below. Smith found this also to be true with his trash-carriers, none of which are mentioned as snail-carriers.

One evening Dr. Guthrie, Roy Ash, and the author, carefully pulled the snails off the backs of two specimens and placed them in dirt containing many *Strobilops labyrinthica* and other small snails from the Lawrence Church region, Washington County, Ohio. As soon as they found themselves divested of their cloaks, they became frantic, rushing around and seizing the first objects available. One secured a lump of dirt, one *Carychium*, and one *Euconulus* and fixed them on its back. The other secured a large juvenile shell of *Cochlicopa lubrica* and a piece of dirt for its new cloak. After fastening these first objects on their backs, they behaved more leisurely. The next morning, however, they were so overloaded with small snails that each could walk only with difficulty.

At this time the one *Cochlicopa* and the *Euconulus* mentioned above were seen to be living but they were withdrawn within their shells. This observation was made under a binocular, without removing the snails from the backs of the "snail-lions". The burdens of snails of each larva suspiciously and gradually disappeared during the next few days, after which most of the shells, including the two mentioned above, were found to be empty. These suspicions were confirmed later, both at Marietta College and at Indiana University, when living insects were seen to remove living snails from their burden, thrust the long sucking spears within the aperture into the body of the snail. The snails soon were deflated, much as the ordinary aphis-lions deflate plant lice. These observations change our concept of the burden. It is a "pantry" as well as a "cloak" and a "graveyard". However, the last hardly applies, for after the feast, the shell was more often discarded than replaced on the back, especially if a fresh supply of small snails were available.

FIXATION OF SHELLS AND HIBERNATION.

It is very interesting to watch a larva "fix" a snail on its back. The larva seizes the snail shell between the curved sucking spears, as one would pick up an object with pincers. Both abdomen and head are elevated, by raising the third and first pairs of legs respectively, while the mesothoracic region is lowered, by widely spreading the second pair of legs. This allows the head to be thrown straight back and the abdomen to be elevated, at times almost to the vertical. The shell still clasped by the sucking-spear pincers is placed among the hooked hairs on the back, and worked back-and-forth only for a very short time, after which it sticks. The animal is so small, and the process completed so quickly, that it is difficult to observe with hand lens or binocular. Moreover, the animal goes through the process rarely while being watched, and never when you would like to have it thus perform. If the shells after "fixation" are removed and examined under the binocular, fine silk-like strands can be observed to be plastered over their surface. I think that spinnerets on the tip of the elevated abdomen secrete the semi-fluid silk, which quickly dries on the shell and elsewhere hardens to form strands, which when the shell is worked back-and-forth, engage the hooked hairs on the back. However, I have yet to observe the silk being secreted. The whole process of "fixing" a shell can be completed in less than thirty seconds. The thoracic pedicels, the bristles of which are not hooked, serve as a "hay-rack" to support the overhanging portions of the burden. These have been previously described in detail (Jones, 1929). Some of the larger snails have been observed to escape from the cloak of the Squaw Hollow specimen. They continued to live quite normally, outliving the insect.

Attempts to raise the larvae in captivity have all resulted in eventual failure, though some have been kept for several weeks in a jar filled partially with dry leaves, screened over the top. Such a jar kept during the winter indoors at room temperature yielded the following observations at Marietta College. A drop of water occasionally had to be inserted to relieve excessive

dryness. It was cautiously avoided, however, by the larvae which would crawl back among the dry leaves. Excessive humidity is to be avoided, as moulds tend to accumulate and the larvae die. In the latter part of November the larvae curl the edges of the leaves and hibernate. This is probably much later than hibernation under natural conditions as the room was quite warm. I uncoiled the leaf a few times and found they were using little or no silk in the construction of their "nest". As they coiled the leaves tighter finally, I decided to let them alone until Spring. Then I found nothing by fragments of the pupae and of wings too shattered for identification. Also some white oval eggs were present, but were so dry and brittle that they shattered. At Indiana University the successful emergence of the adult from the pupal case occurred so early in the morning that it was unobserved. Shortly after its emergence I found it on the underside of the screen covering the jar. The body of the adult was still soft, moist, and light-colored. So eager was I to secure the wings for venation-study that I killed the creature before the body attained maturity of color and rigidity.

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# A New Opisodasys from Idaho (Siphonaptera: Dolichopsyllidae).

By Irving Fox, Washington, D. C.

The following new species of *Opisodasys* Jordan (1933, p. 72) is named in honor of Dr. W. L. Jellison, who has recently (1939) redescribed the other known species of the genus. In that paper and in another recently published by Jordan (1939, p. 316), the male of *O. robustus* (Jordan) is described, and is shown to be the same as that of *O. spatiosus* I. Fox (1940, p. 65). Hence the latter name falls as a synonym of *O. robustus.*

Through the courtesy of the authorities of the United States National Museum, the writer has had the opportunity to study the collections in their charge which include determined specimens of *O. enoplus* (Rothschild) and *O. robustus,* and type material of the following species: *O. pseudarctomys* (Baker), male and female; *O. keeni* (Baker), male and two females; and *O. vesperalis* (Jordan), male and female. Since specimens of all the known species of the genus have been available for study, it has been possible to devise a key to aid in the determination of the males. The type species of the genus is *Ceratophyllus vesperalis* Jordan (1929, p. 28), by original designation.

Key to the Species of Opisodasys Jordan (males only).

1. Sternal plate VIII broad basally, truncate distally, *O. jellisoni,* n. sp.
   Sternal plate VIII narrow basally, not truncate distally..2
2. Process of clasper bifurcate ........................3
   Process of clasper not bifurcate......................4
3. Lobes of process of clasper subequal....*O. pseudarctomys*
   Posterior lobe of process much shorter than anterior, *O. vesperalis*
4. Uppermost spiniform bristle of movable finger elbowed near base, not straight, apex directed upward..*O. robustus*
   Uppermost spiniform bristle of movable finger not elbowed, straight or with apex directed downward..........5
5. Sternal plate VIII with an apical bristle.........*O. keeni*
   Sternal plate VIII without an apical bristle....*O. enoplus*

**Opisodasys jellisoni**, n. sp. (Figs. 1, 2, 3.).

♂. Preantennal region of head with two rows of bristles; upper row consisting of seven bristles, lower row of three much longer ones. Post-antennal region with three bristles, in addition to a marginal row of five. Labial palpus almost reaching to apex of fore coxa, acuminate distally. Pronotal comb consisting of about 21 spines. Mesopleural suture with one bristle, mesepimeron with three bristles. Supraepisternum with one bristle, infraepisternum with three bristles; metepimeron with two bristles. *Modified segments.*—Movable finger, process of clasper and sternal plate VIII as shown in Fig. 1. Penis long and slender, spring short not completing a turn.

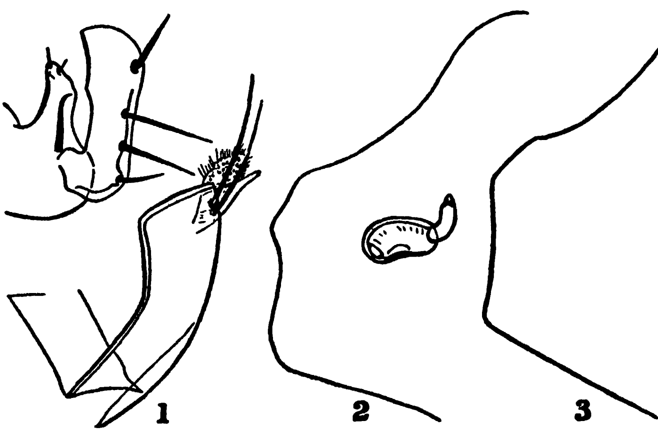


Fig. 1. *Opisodasys jellisoni*, n. sp., process of clasper, movable finger and sternal plate VIII of male.

Fig. 2. *Idem.* receptaculum seminis and sternal plate VII of female allotype.

Fig. 3. *Idem*, sternal plate VII of female paratype.

♀. Chaetotaxy of head and thorax not well shown by specimens available. Bristles of upper preantennal row reduced, some of them absent. Labial palpus not acuminate distally. Mesepisternum and mesepimeron each with four bristles. Supraepisternum with one bristle; metepimeron with three bristles. Sternal plate VII showing variation in depth of sinus. In the holotype the sternal plate VII has the shape shown in Fig. 2; while in a paratype it has the shape shown in Fig. 3.

*Type host and type locality.*—Flying squirrel, *Glaucomys sabrinus bangsi* at Deer Park, Boise, Idaho.

*Type material.*—Male holotype and female allotype from *Glaucomys sabrinus bangsi* at Deer Park, Boise, IDAHO, collected December 15-18, 1939, by W. H. Marshall; in the United States National Museum. *Type.*—U. S. N. M. Cat. No. 54259. Male and female paratypes bearing the same data in the Author's private collection.

LITERATURE CITED.

FOX, IRVING. 1940. Notes on North American Dolichopsyllid Siphonaptera, Wash. Ent. Soc. Proc. 42: 64-68, illus.

JELLISON, WILLIAM L. 1939. *Opisodasys* Jordan 1933, a genus of Siphonaptera. Jour. Parasitol. 25: 413-420, illus.

JORDAN, KARL. 1929. Notes on North American fleas. Novitates Zool. 35: 28-39, illus.

ID. 1933. A survey of the classification of the American species of *Ceratophyllus s. lat.* Novitates Zool. 39: 70-79.

ID. 1939. On some Nearctic Siphonaptera. Novitates Zool. 41: 316-320, illus.

## Modification of the Behavior of Dragonfly Nymphs with Excised Labia (Odonata).

By CYRIL E. ABBOTT, Harding College, Searcy, Arkansas.

About fifteen years ago certain experiments carried on with the nymphs of *Anax* and *Aeschna* established the fact that those insects are capable of modifying their activities to the extent that they will learn to come to the experimenter for food.

Recently it occurred to me that it might be of interest to perform similar experiments, using instead of normal specimens, those from which the labia had been removed. Unfortunately the relatively active Aeschnids were not obtainable, and it was necessary to use the more sluggish Gomphids and Libellulids instead. Yet, even with these, the results of the experiments exceeded expectations.

Each of eleven specimens was treated in the following manner: a looped thread was slipped over the labium until it reached the point where the organ was attached to the head; the thread was drawn tight, ligating the labium proximally;

after which the useless organ was excised just distad of the ligature. This treatment seemed to have no seriously injurious effect upon the nymphs; for, although some of them did die shortly after amputation, so also did some untreated specimens; on the other hand, some of the amputated specimens lived long after the experiments were terminated. Each experimental animal was kept in a preparation dish, containing, in addition to water, a little sand. Once each day an attempt was made to feed the insects by presenting each of them with a bit of meat impaled on the end of a dissecting needle. The materials varied somewhat: raw frog muscle was used, also hamburger, and once liver from a rat.

As in the previous experiments with Aeschnids, one could detect in the behavior of these animals a period of indifference, followed by orienting movements of the head, and, finally a tendency to follow the food about the dish. But what was curiously different from the behavior of normal specimens was the fact that some of these nymphs actually learned to take food from the needle with the mandibles!

A detailed account of the experiment follows. Of the eleven specimens amputated at the beginning of the experiment, three died within two days of treatment; three of the remaining insects gave no response at any time; and one specimen responded once, six days after amputation. The responses of the remaining four specimens, since they are of special interest, are given in detail.

No. III, a Libellulid, gave no response until the third day after amputation, when it accepted food placed in its mandibles. On the sixth day it made as if to seize the food; and on the seventh day it swam toward the food, "lunged" at it, and finally grasped this food with its mandibles. This behavior was repeated on the ninth day, rather feebly, however. The animal was dead on the tenth day.

No. IV, a Gomphid, made slight movements toward the food the day following amputation. It gave no other response until the eighth day, when it followed the food about the dish. On the ninth day this nymph not only followed the food, but

finally succeeded in taking some of it with the mandibles. It died on the tenth day after amputation.

No. V, a Gomphid, gave slight positive responses the day after amputation. Until the sixth day it gave no other definite response, although it invariably took food placed in its mandibles. On the sixth day it attempted to seize the food, which it followed for some distance; on the seventh day it succeeded in obtaining some of the food. On the eighth day it only partially responded, but again on the ninth day it duplicated its behavior on the seventh. The experiment was terminated on the tenth day, as most of the other specimens had died.

No. VII, a Gomphid, took food placed in its mandibles the day after amputation, but not until the sixth day did it swim to the needle and take food of its own accord. This it repeated on the seventh day. On the eighth day only feeble responses were given, and the experiment was discontinued.

In considering these results it is well to remember that only a few specimens were used, that of these, only four gave the responses described, and that the responses were, in part, what one might expect to find in untreated animals. Nevertheless, it seems significant that *some* of the nymphs did respond as they did; for this implies that others are capable of doing likewise. It is the more remarkable when one considers the sluggish habits of these myopic, mud-inhabiting forms, lacking the decisive movements and greater visual powers of the Aeschnids. Consider that the labium of the dragonfly nymph is used, not only for seizing prey, but for holding that prey while it is being consumed. The mandibles are poorly adapted to holding food, and they are placed very inconveniently for seizing it.

In view of these considerations, and without implying that the modification exhibits any *intelligence* on the part of the nymph, I feel bound to maintain that it does indicate adaptive powers which are not easily explained on a purely mechanistic basis. The nymph is far from being the mechanically automatic thing some biologists claim. Moreover, the modification involves a modification of the organism *as a whole*. No theory of reflex action *alone* can account for the behavior of the ex-

cised nymph which swims to food, thrusts its head *over* that food, and employs its mandibles in a manner for which they are poorly fitted, and, under normal conditions, would never be employed.

## A New Species of Amblyscirtes from Texas (Lepidoptera, Rhopalocera, Hesperiidae).

By H. A. Freeman, Lancaster, Texas.

**Amblyscirtes belli** n. sp.

♂. *Upperside.* Primaries, black with some fulvous overscaling toward the base and inner margin; three sordid white subapical spots, the top and bottom ones longer than the middle one; a small sordid white spot in interspace $Cu_1$ directly below the bottom subapical spot; a V-shaped, sordid white spot in interspace $Cu_2$ with the bars of the V pointing toward the outer margin of the wings, the upper bar twice as long as the lower one. The spots in some specimens slightly fulvous.

Secondaries. Black with a few scattered fulvous hairs toward the base and inner margin of the wings.

*Underside.* Primaries. Black, somewhat lighter than above except at the base, fulvous overscaling toward the costal margin and apex. The five spots on the upper surface reappear, more distinctly, and in addition there are three spots making a curved connection between the last subapical spot and the small spot in interspace $Cu_1$, with the curvature toward the outer margin below the apex.

Secondaries. Black, nearly completely overscaled with gray in some specimens, in others the overscaling is restricted to the outer margin and base of the wings. Two indistinct, vestigial spots near the costa; one minute discal spot; a submesial row of connected spots forming an irregular line, bordered on the inside by dark scales and on the outside by lighter ones. All spots are dark hoary gray.

Body above black with some long gray hairs on the thorax and anterior part of the abdomen; beneath grayish; sides of the abdomen black, gray scales forming lines between the segments; palpi light gray, with a few scattered black scales; antennae black, ringed with sordid white; club black above, lighter beneath. Fringes of both wings sordid white between the veins black at the ends of the veins.

♀. Similar to the male but with reduced maculation.

Expanse: Male, 24-29 mm., average size 26 mm.; female 23-32 mm., average size 27 mm.

Described from 109 specimens, 68 males and 41 females, collected by the author at Lancaster and two miles west of Vickery, Dallas County, TEXAS, during April, May, June and August of 1940.

This species was placed as undescribed by Mr. E. L. Bell, American Museum of Natural History, New York, and in his honor I take great pleasure in naming it.

*Holotype* male and *allotype* female in the collection of the author. *Paratypes* are being placed in the following collections, three pairs, American Museum of Natural History, New York; one pair, United States National Museum, Washington, D. C.; one pair, Carnegie Museum, Pittsburgh, Pennsylvania; one pair, Field Museum, Chicago, Illinois; one pair, The Academy of Natural Sciences of Philadelphia; one pair, collection of Mr. F. Martin Brown, Colorado Springs, Colorado; one pair, collection of Mr. Lowell Hulbirt, Glendora, California; and one pair in the collection of Dr. A. W. Lindsey, Granville, Ohio. The remaining 87 paratypes will remain for the present in the collection of the author for determination purposes.

*Belli* more closely resembles *celia* Skinner than any of the other species of *Amblyscirtes*. In preparing this description *belli* was compared with 37 specimens of *celia* contained in the author's collection and the following differences were noted.

1. Although a dark species, *celia* is lighter than *belli*. None of the specimens in the type series were as light as any of the 37 specimens of *celia*.

2. *Celia* often has a spot near the end of the cell on the upper surface of the primaries. *Belli* never has a spot in that region.

3. *Celia* is more completely overscaled with lighter scales on the under surface of both wings than is *belli*.

4. The spots on the under surface of the secondaries of *celia* are white, contrasting with the brown rather plainly, whereas *belli* has dark hoary gray spots that are inconspicuous; in some specimens they are nearly absent.

# A Bibliography of Keys for the Identification of Immature Insects. Part II. Odonata[1].

By Wm. P. Hayes.

The study of immature aquatic insects has probably been given more attention than terrestrial forms for the reason that in most instances aquatic insects can be more easily reared and with such rearings has come a greater knowledge of the growing stages. As pointed out in Part I[2] of this work the writer is attempting to make available for investigators the literature containing tables or keys for the identification of the developmental stages of various insect orders. The following references have been gathered for use in class work devoted to the taxonomy of immature insects and many have been tried and found to have distinct value. It is realized that the list is probably not complete and the writer would welcome having his attention called to additional citations.

Among aquatic nymphs (naiads) of the three orders Odonata, Plecoptera and Ephemerida, the Odonata have been given more intensive study by a greater number of students than the Plecoptera or Ephemerida. This perhaps can be attributed to the greater appeal to collectors that is possessed by the adults. Hence more study of younger stages and, as a result, we find more keys for their identification than we find in the other two orders.

Attention should be called to the works of Lamb (1924) and Nevin (1929 and 1930) in which we are supplied with *keys to the instars* of the three species representing both suborders—the Anisoptera and Zygoptera. From these it is apparent that we have scarcely made a beginning of our study of these forms. Moreover Calvert (1934, Proc. Amer. Philosophical Soc. Vol. 73, pp. 63-64) in a study of growth rates and larval development in the genus Anax begins his summary of this work with the following highly significant statement, "Different indi-

[1] Contribution No. 200 from the laboratories of the Department of Entomology of the University of Illinois.

[2] A Bibliography of Keys for the Identification of Immature Insects, Part I—Diptera. Ent. News, Vol. 49: 246-251, 1938; 50: 5-10, 76-82, 1939.

viduals of *Anax junius*, a common North American species, and different parts of the same individual grow at different rates. This renders an *exact* definition of the characteristics of any one of the thirteen larval instars impossible. Nevertheless it is believed that the age of a given larva may be determined within an approximation of one or two instars. All possible characters should be taken into consideration in making such determinations." This condition perhaps occurs in all Odonata and probably in immature insects of all orders. It is an important consideration that must be kept in mind in using our available keys. So many of our key couplets are concerned with size, and from the above quotation it is apparent that statements of size mean very little, unless qualified by the words "when full grown" and even then how many of us are able to say when a larva or nymph is fully developed?

I asked Dr. Calvert to add any references known to him which I had not included in my original draft. He has complied with my request and about half the number here listed have been furnished by him.

ANDER, KJELL. 1926. Beiträge zur Kenntniss der schwedischen Odonaten 1. 2. *Ent. Tids.* 47 (1); 31-42, 14 figs., Taf. 2. (*Agrion hastulatum, lunulatum, armatum, puella;* no keys, but interspecific comparisons.)

ID. 1929. Ueber die Nymphe von *Mesogomphus hageni* Selys. *Konowia* 8 (2): 159-162, 4 figs. (No keys, but comparisons with allied forms.)

AUSSERER, CARLO. 1869. Neurotteri tirolesi colla diagnosi di tutti i generi europei. Parte I. Pseudo-Neurotteri. *Annuario Soc. Nat. Modena* 4: 71-156, Tav. viii-ix. Also separately paged 1-88. (Analytic table of genera of larvae facing p. 84 (16).

BARBICHE (Abbé). 1884-87. Faune synoptique des Odonates ou Libellules de la Lorraine. *Bull. Soc. Hist. Nat. Metz* (2) 16: 11-20, 17: 85-163. Also paged separately 1-93, Metz Imprimerie Even Freres 1887 (on cover), Impr. Verronnais (Fischer Succ.) 1883 (on title-page). (Key to genera of larvae pp. 87-89 (15-17).

BARNARD, K. H. 1937. Notes on dragonflies of the S. W. Cape with descriptions of the nymphs and of new species. *Ann.*

*S. Afr. Mus.* 32: 169-260, 32 figs. (Key to genera of nymphs pp. 182-3.)

BRAUER, F. u. Löw, F. 1857. Neuroptera austriaca. Die im Erzherzogthum Oesterreich bis jetzt aufgefundenen Neuropteren u. s. w. Wien, Carl Gerold's Sohn. Pp. i-xxiii, 1-80, 5 Taf. (Synopsis of genera of Odonate larvae, pp. xiv-xvi.)

BRUES, C. T., and MELANDER, A. L. 1932. Classification of insects. *Bull. Mus. Comp. Zool.* 73. Cambridge, Mass., 672 pp., (Key to families pp. 164-167).

BYERS, C. F. 1927. The nymph of *Libellula incesta* and a key for the separation of the known nymphs of the genus *Libellula*. *Ent. News* 38: 113-115. 1927. (Key to species pp. 114-115).

ID. 1927. Notes on some American dragonfly nymphs (Anisoptera). *Jour. N. Y. Ent. Soc.,* 35: 65-74, (Key to species of *Anax,* pp. 68-69 and to species of *Tramea* p. 73).

ID. 1930. A contribution to the knowledge of Florida Odonata. *University of Florida Publ. Biol. Sci.* Series 1 (1); 1-327, 19 figs., 11 pls. (Key to spp. of nymphs, pp. 34-39, table for *Enallagma* spp., pp. 194-195).

ID. 1936. The immature form of *Brachymesia gravida,* with notes on the taxonomy of the group (Libellulidae). *Ent. News* 47: 35-37, 3 figs., 60-64. (Key to genera of Corduliinae and Libellulinae, pp. 60-64).

ID. 1937. A review of the dragon-flies of the genera *Neurocordulia* and *Platycordulia. Misc. Publ. No. 36. Mus. of Zool., Univ. Mich.,* pp. 1-36. 8 pls. (Key to species, p. 9).

ID. 1940? A study of the dragonflies of the genus *Progomphus* (*Gomphoides*) with a description of a new species. *Proc. Florida Acad. Sci.* 4: 19-85, tables, 1 graph, 6 pls. 1939. (Key to 3 spp. of nymphs, pp. 58-59.)

CABOT, L. 1872. The Immature State of the Odonata. *Ill. Cat. Mus. of Comp. Zool.,* No. V (*Mem.* of same 2) Part I. Subf. Gomphina, pp. 1-17, Pls. I-III. 1881. Part II. Subf. Aeschnina, *Mem.* of same 8 (1): pp. 35-39. 1890. Part III. Subf. Cordulina, *Mem.* of same 17 (1); pp. 37-41.

CALVERT, P. P. 1893. Catalogue of Odonata (Dragonflies)

of the vicinity of Philadelphia, with an introduction to the study of this group of insects. *Trans. Amer. Ent. Soc.*, 20: 152a-272. (Key to genera of nymphs, pp. 225-227).

ID. 1928. Report on Odonata, including notes on some internal organs of the larvae collected by the Barbados-Antigua Expedition from the University of Iowa in 1918. *Univ. Iowa Stud. Nat. Hist.* 12 (2): 1-54, Pls. I-V. (Generic keys to four Libelluline genera, pp. 15, 18; tables to spp. of *Tramea* and *Erythemis* pp. 29, 34.)

ID. 1934. The rates of growth, larval development and seasonal distribution of dragon-flies of the genus *Anax* Aeshnidae). *Proc. Amer. Philosophical Soc.*, 73 (1): 1-70, 4 Pls. (Key to species of *Anax*, pp. 46-47.)

COWLEY, J. 1933. The larvae of the European species of *Gomphus* Leach. *Ent. Mo. Mag.* 69: 251-252, pl. vii.

DJAKONOV, A. M. 1926. [Our Libellulidae—Keys for the identification of Libellulidae and their nymphs.] In Russian. Exkursion Fauna des Leningraders Gouvernements. Moscow and Leningrade 72 pp. 8° (Paper not seen).

DUFOUR, LEON. 1852. Études anatomiques et physiologiques, et Observations sur les larves des libellules. *Ann. Sci. Nat.* (3) *Zool.* 17 (2): 65-110, Pls. 3-5. (Statement of generic and specific characters of *Aeschna* 3 spp., *Libellula* 2 spp., *Calopterix* 1 sp., *Agrion* 1 sp. pp. 67-73.)

FRASER, F. C. 1925. The true position of the genera *Orogomphus* and *Chlorogomphus* as demonstrated by a study of the larva of *O. atkinsoni* and *O. campioni* and by a comparison of the latter with the larva of *Anotogaster nipalensis*. *Rec. Ind. Mus.* 27 (5): 423-429, pls. ix, x.

ID. 1933-36. The fauna of British India, including Ceylon and Burma. Taylor & Francis, London. Odonata. Vols. I-III. (No keys to larvae, but characters of the larvae of some of the larger groups are given.)

(To be continued.)

# Current Entomological Literature

COMPILED BY V. S. L. PATE, L. S. MACKEY and J. W. CADBURY.

Under the above head it is intended to note papers received at the Academy of Natural Sciences of Philadelphia pertaining to the Entomology of the Americas (North and South), including Arachnida and Myriopoda. Articles irrelevant to American entomology will not be noted; but contributions to anatomy, physiology and embryology of insects, however, whether relating to American or exotic species will be recorded.

This list gives references of the current or preceding year unless otherwise noted. All continued papers, with few exceptions, are recorded only at their first installment.

For records of Economic Literature, see the Experiment Station Record, Office of Experiment Stations, Washington. Also Review of Applied Entomology, Series A, London. For records of papers on Medical Entomology, see Review of Applied Entomology, Series B.

**Note.** References to papers containing new forms or names not so stated in titles are followed by (*); if containing keys are followed by (k); papers pertaining exclusively to neotropical species, and not so indicated in the title, have the symbol (S) at the end of the title of the paper.

**The figures within brackets [ ]** refer to the journal in which the paper appeared, as numbered in the list of Periodicals and Serials published in our January and June issues. This list may be secured from the publisher of **Entomological News** for 10c. The number of, or annual **volume, and in some cases the part, heft, &c., the latter within ( ) follows; then the pagination follows the colon :**

**Papers published in the Entomological News are not listed.**

**No. 150 in this issue is VI Congr. Internac. Ent. Madrid.**

GENERAL.—**Andre & Lamy.**—See under Arachnida. **Anon.**—Damage to scientific institutions in London. [68] 92: 548. **Balduf, W. V.**—More ambush bug prey records (Hemiptera). [19] 35: 161-169. **Blatchley, W. S.**—Obituary by J. S. Wade. [10] 42: 204-208. **de la Torre-Bueno, J. R.**—The perfect description. [19] 35: 175. **Fernald, H. T.**—Comments on C. B. Williams' paper, "On 'type' specimens." [7] 33: 625. **Fuller, H. S.**—Black-flies bite woodchuck. [19] 35: 155. **Gibson, A.**—Controlling insects from the air—a review of work conducted in Canada. [150] 2: 867-872, ill. **Kellogg, Vernon Lyman.**—Obituary, portrait and bibliography by R. W. Doane. [7] 33: 599-607. **Le Cerf, F.**—"Aberrations" et nomenclature. [150] 2: 943-950. **Metalnikov & Metalnikov.**—Utilisation des microbes dans la lutte contre les insectes nuisibles. [150] 2: 555-566. **Poche, F.**—Stabilitat der wissenschaftlichen Namen oder Stabilitat der Nomenklaturregeln. [150] 2: 951-957. **Quilis Perez, M.**—Calculo de las fajas isocondicionales y de las lineas de maximo desarrollo para los insectos [150] 2: 447-454, ill. Influencia de los factores climaticos en el calculo de los ciclos biologicos de los insectos. [150] 2: 621-633. **Reichenow, E.**—Consideraciones sobre el desarrollo de las relaciones ecologicas entre los artopodos y los protozoos por ellos transmitidos. [150] 2: 501-508. **Sandhouse, Grace A.**—In Memoriam, obituary and bibliography by Cushman and Russell. [10] 42: 187-189, ill. **Scotland, M. B.**—Review

and summary of studies of insects associated with Lemna minor. [6] 48: 319-333, ill. **Scott, H.**—General and zoogeographical considerations regarding the Coleoptera associated with giant lobelias and senecios in eastern Africa. [150] 2: 443-446. **de Seabra, A. F.**—Considerations sur l'entomologie du ble. [150] 2: 607-610. **Swank. G. R.**—See under Coleoptera. **Tragardh, I.**—Some problems of modern forest entomology. [150] 2: 887-890. **Uvarov, B. P.**—Locust as an international problem. [150] 2: 535-543, ill. **Weyrauch, W.**—Observaciones entomologicas en el valle de Chanchamayo y en Tingo Maria. [Bol. Mus. Hist. Nat. "Javier Prado"] 4: 346-359. **Williams, C. B.**—On "type" specimens. [7] 33: 621-624.

ANATOMY, PHYSIOLOGY, ETC.—**Abbott, C. E.**—A modification of the feeding reaction of Aeschna (Odonata). [19] 35: 171. **Bliss, C. I.**—The relation between exposure time, concentration and toxicity in experiments in insecticides. [7] 33: 721-766. **Finlayson & Green.**—A note on the effect of certain foods upon fecundity and longevity in Microcryptus basizonus (Hymen.). [4] 72: 236-238. **Nisikawa, Y.**—The respiration of the pupa of Bombyx mori in and outside of cocoon. [Trans. Kansai Ent. Soc.] 10: 27-32.

ARACHNIDA AND MYRIOPODA.—**Andre & Lamy.**—Coloration tegumentaire, ressemblance protectrice et mimetisme chez les Acariens. [150] 2: 413-439. **Beier, M.**—Zur Phylogenie der troglobionten Pseudoscorpione. [150] 2: 519-527. **Pierce, W. D.**—A rare myriapod from Anacapa Island, compared with two Texas species. [38] 158-171, ill. **Senevet, G.**—Quelques Ixodides de la Guyane francaise: especes nouvelles d'Ixodes et d'Amblyomma. [150] 2: 891-898, ill.

THE SMALLER ORDERS OF INSECTS.—**Berner, L.**—Ovoviviparous mayflies in Florida [Pro. Fla. Acad. Sci.] 4: 280. **Byers, C. F.**—A study of the dragonflies of the genus Progomphus (Gomphoides) with a description of a new species. [Pro. Fla. Acad. Sci.] 4: 19-85, ill. **Carpenter, F. M.**—A revision of the Nearctic Hemerobiidae, Berothidae, Sisyridae, Polystoechotidae and Dilaridae (Neuroptera). [Proc. Amer. Acad. A. & S.] 74: 193-280, ill. (k*). **Cope, O. B.**—The morphology of Psocus confraternus (Psocid.). [Microent.] 5: 91-115, ill. **Davis, C.**—Family classification of the order Embioptera. [7] 33: 677-682. (k). **Eglin, W.**—Die Neuropteren der umgebung von Basel.

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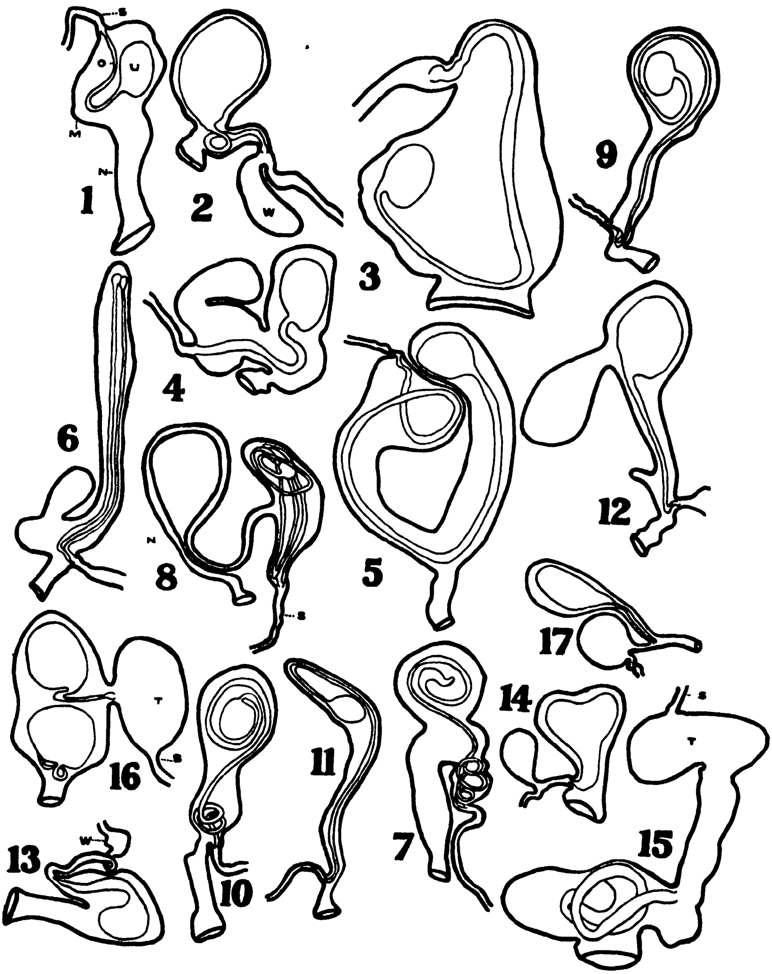


SPERMATOPHORES AND FEMALE REPRODUCTIVE DUCTS, LEPIDOPTERA—WILLIAMS.

Fig. 1. *Scepsis fulvicollis*, 2. *Apantesis arge*, 3. *Isia isabella*, 4. *Estigmene acraea*, 5. *Peridroma margaritosa*, 6. *Platysenta videns*, 7. *Schinia marginata*, 8. *Autographa brassicae*, 9. *Catocala palaeogama*, 10. *C. amatrix*, 11. *Plathypena scabra*, 12. *Coryphista meadi* f *badiaria*, 13. *Tlascala finitella*, 14. *Carpocapsa pomonella*. 15. *Halisidota tessellaris*, 16. *H. caryae*, 17. *Pandemis limitata*.

ENTOMOLOGICAL NEWS

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# The Relations of the Spermatophore to the Female Reproductive Ducts in Lepidoptera.

By JOSEPH L. WILLIAMS, University of Pennsylvania and Lincoln University, Pennsylvania.

(Plate I.)

Spermatophores of Lepidoptera have been known for many years. Balbiani, Hagen, Norris and Stitz discuss them in connection with their principal subject. The first study devoted entirely to spermatophores is that of Petersen, 1907. The only other work on this subject is that of the author, 1939. Higher Lepidoptera have the seminal duct extending from the bursa copulatrix or its duct to the vagina. The sperms follow this path from the spermatophore in the bursa to the vagina and thence to the spermatheca. The purpose of this paper is to discuss the relationship of the spermatophore to the bursa copulatrix and to the seminal duct.

I wish to thank Dr. Philip P. Calvert for his kindness during the progress of this investigation, Mr. John W. Cadbury, 3d, for identifying the specimens and Dr. A. Glenn Richards, Jr., for criticisms and helpful suggestions.

Females were captured by means of a light trap described by the author, 1939. The reproductive organs were dissected in physiological salt solution and the contents of the bursa observed. The diagrams were drawn with the aid of a camera lucida using the same power of the same microscope throughout.

Although the shapes of the bursa and spermatophore vary to a considerable degree even in the same family, the females observed, according to this study, are of classes A, B and C. Class A is composed of those females having the spermatophore in direct communication with the seminal duct. Since most of the females observed belong to this class, the bursa and spermatophore of only a few serving as types are figured.

Some specimens had more than one spermatophore; each represents a pairing, but only one at a time communicates with the seminal duct (fig. 6). Members of class B do not have the spermatophore communicating directly with the seminal duct, but with a duct that leads to a secretion-filled reservoir.[1] The seminal duct extends from this reservoir to the vagina. A last class of primitive moths C has no seminal duct. The spermatophore opens into the bursal duct, which extends to the vagina. The anatomy of this type is given in a forthcoming paper.

The insects are taxonomically arranged in descending order. Names used are those of the McDunnough check list unless otherwise indicated.

## Class A

Macro-lepidoptera
Superfamily Noctuoidea
Family Amatidae
*Scepsis fulvicollis* Hbn. Fig. 1
Family Arctiidae
Subfam. Arctiinae
*Apantesis arge* Dru. Fig. 2
*Isia isabella* A. & S. Fig. 3
*Estigmene acrea* Dru. Fig. 4
Family Phalaenidae
Subfam. Phalaeninae
*Agrotis ypsilon* Rott[2]
*Feltia subgothica* Haw.
*Peridroma margaritosa* Haw., Fig. 5
Subfam. Hadeninae
*Scotogramma trifolii* Rott.
*Polia subjuncta* G. & R.
*P. legitima* Grt.
*P. renigera* Steph.
*Orthodes* sp. ?
*Ceramica picta* Harr.
*Protoleucania albilinea* Hbn.
Subfam. Amphipyrinae
*Agroperina helva* Grt.
*Oligia fractilinea* Grt.
*Platysenta videns* Gn. Fig. 6
*Elaphria grata* Hbn.
*Anorthodes tarda* Gn.
*Galgula partita* Gn.
*Prodenia ornithogalli* Gn.
*Ogdoconta cinereola* Gn.
Subfam. Heliothiinae
*Heliothis obsoleta* Fabr.
*Schinia arcigera* Gn.[3]
*S. marginata* Fig. 7
Subfam. Acontiinae
*Erastria carneola* Gn.
Subfam. Plusiinae
*Autographa brassicae Riley* Fig. 8
*A. oo*[4]

Subfam. Catocalinae
*Catocala palaeogama* Gn. Fig. 9
*C. amatrix Hb.* Fig. 10
*C. ultronia* Hb.[5]
*Caenurgina crassiuscula* Haw.
*Anomis* sp.
Subfam. Hypeninae
*Plathypena scabra* Fabr. Fig. 11
Subfam. Herminiinae
*Bleptina caradrinalis* Gn.
*Palthis angulalis* Hbn.
Family Notodontidae
*Dasylophia anguina* A & S
Superfamily Bombycoidea[6]
Family Lasiocampidae
*Lasiocampa quercus* L.[7]
*L. callunae*[7]
*Gastropacha quercifolia* L.
*Cosmotriche potatoria* L.
*Malacosoma americana* Fabr.[7]
*M. neustria* L[7]
Superfamily Geometroidea
Family Geometridae
Subfam. Sterrhinae
*Haematopis grataria* Fabr.

Subfam. Larentiinae
*Coryphista meadi* f. *badiaria* Hy. Edw., Fig. 12
Subfam. Ennominae
*Semiothisa nigrocominae* Warr.
*Vitrinella pampinaria* Gn.
Micro-lepidoptera
Superfamily Pyralidoidea
Family Pyralidae
Subfam. Pyraustinae
*Desmia funeralis* Hbn.
*Nomophila noctuella* D. & S.
*Loxostege similalis* Gn.
*Phlyctaenia ferrugalis* Hbn.
Subfam. Chrysauginae
*Galasa nigrinodis* Zell.
Subfam. Crambinae
*Chilo puritellus* Kft.
Subfam Phycitinae
*Tlascala finitella* Wlk. Fig. 13
*Ephestia kuhniella* Zell.
Superfamily Tortricoidea
Family Olethreutidae
Subfam. Laspeyresiinae
*Carpocapsa pomonella* L. Fig. 14

Class B

Macro-lepidoptera
Superfamily Noctuoidea
Family Arctiidae
Subfam. Arctiinae
*Halisidota tessellaris* A & S. Fig. 15

*H. caryae* Harris Fig. 16
Superfamily Tortricoidea
Family Tortricidae
*Pandemis limitata* Rob. Fig. 17

Class C

Without a seminal duct.
Superfamily Incurvarioidea
Family Prodoxidae

*Tegeticula alba* Zell.
(=*yuccasella* Riley)
*Proxodus quinquepunctella* Cham.

Members of the superfamily Incurvarioidea have the spermatophore opening into the bursal duct, which extends to the

Some specimens had more than one spermatophore; each represents a pairing, but only one at a time communicates with the seminal duct (fig. 6). Members of class B do not have the spermatophore communicating directly with the seminal duct, but with a duct that leads to a secretion-filled reservoir.[1] The seminal duct extends from this reservoir to the vagina. A last class of primitive moths C has no seminal duct. The spermatophore opens into the bursal duct, which extends to the vagina. The anatomy of this type is given in a forthcoming paper.

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*Protoleucania albilinea* Hbn.
Subfam. Amphipyrinae
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*Heliothis obsoleta* Fabr.
*Schinia arcigera* Gn.[3]
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Subfam. Acontiinae
*Erastria carneola* Gn.
Subfam. Plusiinae
*Autographa brassicae Riley* Fig. 8
*A. oo*[4]

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[1] Bursa usually without any secretion. In these species it is only the reservoir that is filled with a secretion.
[2] Bursa and spermatophore similar to that of *Peridroma margaritosa* Haw.
[3] Bursa and spermatophore similar to that of *S. marginata.*
[4] Bursa and spermatophore similar to that of *A. brassicae.*

Subfam. Catocalinae
*Catocala palaeogama* Gn. Fig. 9
*C. amatrix Hb.* Fig. 10
*C. ultronia* Hb.[5]
*Caenurgina crassiuscula* Haw.
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Superfamily Pyralidoidea
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*Desmia funeralis* Hbn.
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Subfam. Chrysauginae
*Galasa nigrinodis* Zell.
Subfam. Crambinae
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Superfamily Tortricoidea
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*Carpocapsa pomonella* L. Fig. 14

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Macro-lepidoptera
Superfamily Noctuoidea
Family Arctiidae
Subfam. Arctiinae
*Halisidota tessellaris* A. & S. Fig. 15
*H. caryae* Harris Fig. 16
Superfamily Tortricoidea
Family Tortricidae
*Pandemis limitata* Rob. Fig. 17

Class C

Without a seminal duct.
Superfamily Incurvarioidea
Family Prodoxidae
*Tegeticula alba* Zell. (=*yuccasella* Riley)
*Proxodus quinquepunctella* Cham.

Members of the superfamily Incurvarioidea have the spermatophore opening into the bursal duct, which extends to the vagina.

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[5] Bursa and spermatophore similar to that of *C. amatrix*.
[6] All members of this superfamily except *M. americana* are from Meyrick's revised handbook of British Lepidoptera, London, 1928.
[7] The spermatophore is too small to be certain of its relation to the seminal duct.

In the three species listed under class B, it might be argued that the secretion-filled reservoir is not a part of the bursa copulatrix, but a swollen part of the seminal duct. Such a distinction is of comparative morphological interest. It is only a forensic argument here. Whatever the morphological homology of this reservoir may be, it is functionally the same; namely a secretion-filled sac through which the sperm must pass in order to reach the narrow duct leading to the vagina. In this sense they are exceptions to the general rule in the higher lepidoptera. A comparison of the bursa copulatrix and seminal duct of *Carpocapsa pomonella* (fig. 14) and *Pandemis limitata* (fig. 17) suggest that in the Tortricoidea at least the secretion-filled reservoir had best be considered a pouch on or just off the seminal duct.

SUMMARY.

61 species representing 52 genera in 18 subfamilies of 9 families of 6 superfamilies of Lepidoptera were examined. The six superfamilies were Noctuoidea (39 species), Bombycoidea (6 species), Geometroidea (4 species), Pyralidoidea (8 species), Tortricoidea (2 species) and Incurvarioidea (2 species). Two types of relationship of the spermatophore to the seminal duct were noted. (1) In 56 of the species representing all superfamilies except Incurvarioidea, the spermatophore opens into the seminal duct. (2) In only three species, one of which is debatable, representing two genera (1 Noctuoid and 1 Tortricoid) the spermatophore does not open directly into the seminal duct. In these the open end of the spermatophore connects with a secretion-filled reservoir; this reservoir in turn connecting with the seminal duct.

The spermatophore, of course, is secreted by the male at the time of pairing. It is so formed and hardened in the bursa copulatrix of most Lepidoptera that the sperm leaving its open end pass directly into the seminal duct leading to the vagina. Thus the first stage of the frequently torturous wandering of the sperm within the female moth is assured by the structure of the spermatophore, as already reported by Norris and Petersen. But in rare cases the spermatophore empties into a secre-

tion-filled reservoir in turn connecting with the seminal duct. In these exceptional cases the first stage of sperm migration cannot be so simple. How sperm may traverse such a secretion-filled reservoir is not known.

The most primitive families of moths have a fundamentally different type of female reproductive system. One of these, the Yucca Moth, is being treated in a separate paper. No seminal duct is present. The spermatophore opens into the bursal duct, which extends to the vagina.

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## Explanation of Plate I.

Parts of the reproductive organs of the species indicated at the bottom of the plate and in the list on pages 62-63.

Abbreviations: M, Bursal cavity; N, Bursal duct; O, Neck of spermatophore; S, Seminal duct; T, Reservoir; U, Head of spermatophore; W, Reservoir.

# A Bibliography of Keys for the Identification of Immature Insects. Part II. Odonata.

By WM. P. HAYES.

(Continued from page 55.)

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(To be continued.)

# A Population Study of a Bumblebee Colony, Bombus americanorum Fabr. (Hymen.: Bombidae).

By PHIL RAU, Kirkwood, Missouri.

This is a population study of one colony of *Bombus americanorum* Fabr., removed on August 23, 1939, from its nest at Pacific, Missouri. While this species normally nests in the ground, this one was found in an old rodent's domicile in the hollow portion of a fallen log near a field of red clover.

Important studies in population problems of social insects have been made by such able investigators as Emerson[1], Bodenheimer[2], and others, but the life conditions of social insects are so intricate and the studies of colonies so difficult that many data must yet be gathered before extensive generalizations may be made. In regard to population studies of bumblebees, Bodenheimer says that "no reliable data are yet known on the duration of development, on longevity, or on total egg-production" and that the "lack of the relation between the number of cells and the number of individuals in the nest is even greater than in the wasps". For certain species of American bumblebees, however, Plath[3] and Frison[4] have recently supplied many of the missing data; but even so, the last word has not yet been said on bumblebee populations; therefore, when I had the opportunity to take a colony of *B. americanorum* late in the season, I decided to gather what information I could add to the meager knowledge of bumblebee populations.

The date when the nest was taken, August 23, is about four weeks before the colonies break up for the winter; that is if the information which Frison obtained for this species in Illinois holds also for Missouri, which is quite likely. The colony as taken was complete except for three workers, which spent the night away from home and were taken on their return next morning.

[1] Population of Social Insects. Ecological Monographs 9: 287-300, 1939.

[2] Population Problems of Social Insects. Biol. Rev. 12: 393-430, 1937.

[3] Bumblebees and Their Ways. pp. 199, N. Y., 1934.

[4] A Contribution to the Knowledge of the Bionomics of Bremus americanorum. Ann. Ent. Soc. Amer. 23: 644-665, 1930.

The food reserves in the nest were scanty; there were only four cocoons full of honey, and one full and three half full cocoons of pollen. In addition, six others gave evidence of having at one time served as pollen containers. None of the containers were sealed. These were the old cocoons from which insects had emerged and were later used as containers.

Frison, who has very thoroughly worked up the life history of *B. americanorum*, says that *Psithyrus variabilis* is the common social parasite of this bumblebee. I looked carefully for evidence of this parasite in the colony but found none; nor was there any evidence of damage done by other parasites. Only a few foreigners were found in the nest; one caterpillar that might have been *Vitula edmandsii* (since it resembled a figure in Plath's book); four adult beetles, *Harpalus herbivagus* Say. (L. L. Buchanan det.), whose interest in the nest could not be determined; a half-dozen nymphs and a half-dozen empty egg cases of the woodroach *Parcoblatta* sp. The beetles and roaches were evidently scavengers and probably in no way injured the colony.

## A Census of the Colony.

### Immature Population.

Eggs; two batches totaling.............................. 20
Larvae; small, about ½ grown or less.................. 26
Larvae; medium, males or workers in act of spinning cocoons 13
Larvae; large, queens in act of spinning cocoons......... 10
Large cocoons containing adult queens.................. 58

Thirty-five of the above were fully pigmented and winged, ready to emerge as adults; 23 had white bodies, some of which were just beginning to become pigmented.

Large cocoons containing quiescent larvae of queens...... 17
Cocoons with workers .................................. 0
Cocoons; small, with male pupae........................ 48

Of the 48 listed above, 8 were fully formed ready to emerge, 17 were only partly pigmented, 23 were completely white.

Small cocoons with quiescent larvae (sex unknown)...... 46

Since the size of adult workers and adult males are the same (Plath) one may legitimately expect the

cocoons also to be the same size for both castes; therefore, the 46 listed above may be either males or workers.

| | |
|---|---|
| Total of immature organisms in colony | 238 |

Adult Population.

| | |
|---|---|
| Foundress queen; only one in colony with frayed wings | 1 |
| Adult workers; dried pinned specimens, 14 to 17 mm.[5] | 95 |
| Dwarfed workers.[6] | 4 |
| Young queens; dried, pinned specimens, 20-22 mm | 26 |
| Young queens; dried, pinned specimens, about 18 mm | 3 |
| Workers which returned next day | 3 |
| Total number of adults in colony | 132 |

The tables show that the immature organisms totaled 238 and the adults 132, thus giving a grand total for the colony of 370. How many of the immature organisms would have reached maturity before the coming of winter is not known; it probably would depend upon climatic conditions. At any rate, the colony at that late date would have no use for additional workers, and actually we do not find any immature workers in the nest, granting that the 46 small cocoons with larvae, whose sex could not be determined, are males. If these 46 larvae are males, then the colony would have had, before the close of the season, a population of 94 males; they would then almost have equaled the workers in number, whose total was 102.

It is interesting to note that there were no males in the nest on August 23, but that 29 new queens were there. The emerging date for males was still some time off because of the 48 males still within their cocoons, only eight were so far along in their development as to have the bodies pigmented. In con-

[5] Measurements of adults of this species according to Plath (p. 164) are: queens 22 mm., workers 17 mm., males 17 mm.

[6] There were four dwarfed workers in this colony and Frison (p. 660) finds that workers of this species produced in the early part of the season are often very small. For certain social wasps (Ecology 20: 440, 1939) it was found that workers of the first brood, probably due to undernourishment are often of small size.

trast to this when queen cocoons were cut open it was found that 35 out of the 58 were completely formed, with wings expanded, and ready to emerge. In this nest, at least, the queens became adult sometime before the males.

It is also interesting to note that while 29 adult queens were in the nest, there were, in addition, 85 cocoons (58, 17, and 10; see table) which contained immature queens that would have emerged before the close of the season had the colony not been disturbed. This would have given a total of 114 queens. Since apparently there would have been no more worker bees becoming mature, our total population of workers is 102. This colony, then, would have produced before the end of the summer 114 queens and 102 workers.

An item of much importance, also, in a colony of this kind is the amount of mortality among the bees during the working season. In populations of social insects generally, it is not always easy to study the relation of the number born to the number that survive to the end of the season. In bumblebees, however, a study of this kind is comparatively easy, since each adult leaves behind a telltale cocoon from which it hatched, and unlike other social insects, the cells are not used a second time for brood. Therefore when we counted 132 adults in the colony, we would expect to find 131 empty cocoons in the nest (deducting 1 cocoon for the queen which was born elsewhere). A count actually gave us 137 empty cocoons, showing that the total loss of adult insects for the summer was only six. A separation of the cocoons into two sizes, queen cocoons and worker cocoons, showed no loss of queens; there were 29 queens in the colony and 29 large empty cocoons. The six bumblebees that had been lost, came from among the worker caste. The lack of mortality of the queens was only to be expected, since they were young and had probably spent no time outside the nest. The mortality among worker bees is indeed low and proves, for this colony at least, that in a world of enemies, *Bombus americanorum* with her big body, flashy colors, audible hum and severe sting holds her own very well.

# Triungulins of a Rhipiphorid Beetle Borne by Elis quinquecincta Fabr. (Coleoptera).

By ROBERT W. PYLE, Biological Laboratories, Harvard University, Cambridge, Massachusetts.

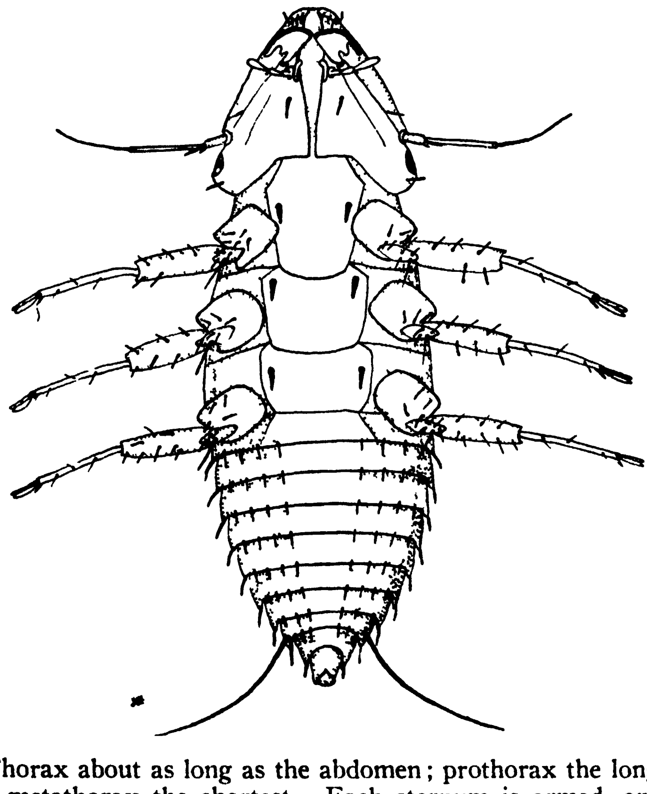
Among the specimens of Coleoptera, Diptera, and Hymenoptera collected at Sycamore Mills (near Philadelphia), Pennsylvania, during August, 1938, were a male and female *Elis quinquecincta* Fabricius. Subsequent examination of the Hymenoptera disclosed the fact that each of these two specimens had four triungulins attached to it. On the male one was attached to the hairs of the right side of the clypeus, one to the hairs of the prothorax, and one between the tarsal claws of each middle leg. The female *Elis* bore two attached to the hairs of the prothorax, one at the apex of the right hind wing, and one on the basal portion of the left hind wing on the anal vein.

These triungulins had been killed, as was the host, in a cyanide bottle and were quite dry when discovered. They were cleared in potash and mounted in gum damar, and probably belong to the genus *Rhipiphorus;* they may be described as follows:

Length 0.34 mm., width 0.12 mm. Body uniformly intensely black with the eyes slightly darker. The entire body much flattened dorso-ventrally, about twice as wide as thick throughout.

Head triangular, one-twelfth wider than long; the front border forming a blunt point. Eyes set upon the posterior corners of the head, and appearing, in specimens cleared in potash, to be composed of four or five ommatidia of more or less uniform size. Antennae three-jointed, cylindrical; a small basal joint, a short second joint, and the third joint more than twice as long as the second. Two apical setae, one much larger than the other, are set in the apex of the second joint. The apical seta of the third joint is long and extremely thin, its apex seen only after careful scrutiny under an oil immersion lens. The antennae and setae are about as long as the head. The palpi are about one-fourth the length of the head, three-jointed; joints cylindrical. Mandibles large, somewhat triangular, bluntly pointed; concealed beneath the head when

closed and capable of overlapping slightly. They are set, on the posterior border, into a socketlike depression. Labrum with a number of setae along the ventral exposed portion. There is also one ventral in front of each antenna, one ventral back of each eye, and one along each side of the median ventral groove that runs the entire length of the head passing dorsad to the closed mandibles.



Thorax about as long as the abdomen; prothorax the longest, and metathorax the shortest. Each sternum is armed, on the anterior portion, with two very heavy bristles, one on each side.

The abdomen is relatively short in comparison to its width and is composed of nine segments in addition to an apical membranous process. Each segment bears a number of setae on the posterior margin ventrally; these are arranged in four longitudinal rows on each side with another row on the lateral margins of the segments. In addition to these the eighth seg-

ment bears laterally a pair of long bristles. The dorsal part of the body is devoid of bristles or setae.

The legs are about one-half the length of the body, and about equal in size. The femora are somewhat thickened, the tibiae more slender, and the tarsi apparently composed of three slender joints supported by a process equally long, but even under oil immersion their structure is exceedingly difficult to ascertain. Each part of the leg bears a number (4-8) of bristly hairs of varying lengths.

The method of attachment of these triungulins to the host is the same as has been described by Brues (1924) for *Horia maculata* Swed. Several hairs, or in some cases one hair, are grasped in such a way that they pass along the median ventral groove of the head dorsad to the mandibles which close below them. That this method of attachment is secure is attested by the fact that the specimen attached to the apex of the hind wing of the female *Elis* was extended at an angle and the legs were directed posteriorly. This wasp, being a fairly rapid flyer, must have given her passenger quite a dizzy ride. No ridges were observed on the mandibles as is the case of *Horia maculata.*

Reference of these triungulins to the genus *Rhipiphorus* is based upon a few distinguishing characteristics. *Rhipiphorus* is the only genus in which the eyes are set upon the posterior corners of the head with the antennae just anterior to them (Böving and Craighead, 1931, p. 281, figs. E. & G.). In all other genera the antennae are located upon the anterior half of the head with the eyes either upon the anterior half or near the middle. In some the eyes are located upon the posterior corners, but the antennae are well forward. Cros (1920) states that the numbers of ocelli are good characters for distinguishing between the various triungulins. He states the *Sitarini* possess two ocelli, *Rhipiphoridae* three, *Macrosiagon, Emmenadia, Rhizostylops* four, *Stylops* several and the other *Meloidae* (*Horiini, Meloini, Lyttini*) one. Böving and Craighead (1931), on the other hand, figure (p. 281 fig. E.) *Rhipiphorus solidaginis* Pierce with five ocelli. The triungulin in question has four or five; the exact number being difficult to

determine due to their extremely small size. It seems that the position of the eyes and antennae rather than the number of ocelli is a better character for distinguishing this genus from closely related ones. Chobaut (1919) figures *Rhipidius densi* (p. 204), but although the eyes are located upon the posterior corners of the head the antennae are far forward. *R. densi* also possesses many more bristles than the triungulin in question.

The mandibles of this triungulin are broader than those shown in most figures, and do not correspond well with those figured by Böving and Craighead (1931). This difference, I believe, is due to the amount of clearing done in potash. The anterior border of the mandible is much thicker than the posterior portion. Consequently, at first sight the mandibles appear to be thin hooked structures and it is only after detailed study of a number of specimens that the posterior portion is evident. The position of the mandibles eliminates the possibility of these specimens belonging to the *Epicauta* or *Macrobasis* as described by Milliken (1921), since the mandibles of those genera are visible from above at all times. In the specimen in question the mandibles are well concealed by the labrum when closed. Other genera, *Tetraonyx, Zonitis Horia, Meloe*, with the mandibles placed so that they are not visible from above, have the antennae and the eyes located more toward the anterior portion of the head; this distinguishes them from *Rhipiphorus*. As is common with all genera having the mandibles so placed, these triungulins have a median ventral groove running the entire length of the head on the ventral surface. It is in this that the hair of the host is pressed by the mandibles.

The tarsus is worthy of note. It appears to be composed of three more or less equal joints which are supported by an equally long process. The structure of the tarsus is very difficult to determine, even using an oil immersion lens, and its clarity depends upon the amount of clearing in potash. Cros (1920) states that the specimens of *Meloini* he observed possessed tarsi which terminated in three similar curved claws, of equal thickness or sometimes with the median one stouter and straight. These types he termed "en fourche" and "en trident

de Neptune". Brues (1924) describes the tarsus of *Horia maculata* as "reduced to a single curved claw on each leg". Pierce (1904) describes *Rhipiphorus (Myodites auct.) solidaginis,* Pierce: "Tarsus apparently three-jointed with a long claw, almost entirely concealed by a large, transparent, fleshy, elliptical sucker which is double its length." The triungulin found upon *Elis* also has the tarsus three-jointed, but the so-called sucker is only as long as the tarsus. Unfortunately, Pierce's figures are not sufficiently detailed to show the form of the tarsus in that species.

The presence of these triungulins, genus *Rhipiphorus,* upon both male and female *Elis quinquecincta* led me to examine other specimens of this wasp to see if they also bore triungulins. Accordingly, I examined the collection of Prof. C. T. Brues, which he so kindly placed at my disposal. This series contained specimens taken in various parts of the United States from Texas and Chicago eastward. In no case was I able to discover any triungulin upon any of the specimens in this collection, although they had been taken at various times during the entire season. This is not, however, the first case of triungulins having been found associated with wasps. Barber (1915) has noted *Macrosiagon flavipennis* in the cocoon of the wasp, *Bembex spinolae.* The presence of these Rhipiphorid triungulins upon *Elis quinquecincta* can probably be explained as a case of mistaken host as the *Elis* were taken while feeding upon some flowers.

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## Does He Stridulate? (Lepidoptera : Eupterotidae).

By WM. T. M. FORBES, Department of Entomology, Cornell University, Ithaca, New York.

*Tamphana marmorea* Schaus is a striking little moth, more or less related to the North American *Apatelodes*,—one of the odd American group which has, roughly speaking, the venation and strong frenulum of the Notodontidae, larva of the Lasiocampidae and appearance of the Bombycidae,—a group which I should rate as a subfamily of Eupterotidae, though Schaus places it with the Bombycidae[1].

For the Apatelodinae as a whole the genitalia are of normal character: uncus well developed and articulated with the inflated tegumen, as in Bombycidae, Geometridae, Sphingidae, etc.; valves well developed, normal in character and articulation, their inner side articulating with a transtilla above and a normal juxta below; tegumen and vinculum forming a normal ring, the latter with a more or less distinct saccus; gnathos showing a slight peculiarity in being often continuously chitinized with the tegumen, though the two elements show separate systems of sculpture in *Olceclostera*, at least.

The genera as a whole fall into two groups, which do not correspond to the venational groups used in "Seitz",, but do correspond with the few known larvae. In the first, typified by *Epia*, the eighth segment is highly modified, chitinized, and

[1] See Seitz's "Macrolepidoptera of the World" vol. vi, pp. 675, 692, pl. 89, fig. k8.

toothed or spined dorsally and ventrally; uncus reduced and more or less membranous, and aedeagus long and slender; but the valves, while a little reduced in size and simplified, are normal in general structure, position, attachments, and obviously in function. The larvae show masses of very characteristic hair-scales. *Quentalia* is typical of this group, which includes *Anticla, Zanola, Colla* and *Epia.* In the last two the specialization has gone further and the last two segments are hopelessly fused.

The other type is that of true *Apatelodes.* The uncus is strongly chitinized and clearly articulated, is most often forked, and plainly fully functional; the eighth segment is unmodified, the aedœagus very short and stout, usually simple, and the valves are large and complex, often showing some trace of a clasper, and typically with a hairy lobe projecting posteriorly from the costal articulation. The known larvae have tufts and pencils of fine hair. *Apatelodes, Olceclostera, Arotros, Drapatelodes, Colabata, Compsa and Drepatelodes* belong to this group, though with some variation,—*Compsa, e.g.,* has lost the juxta.

*Tamphana* (see figure 1) falls quite outside this picture. The uncus is as reduced as in any Epiine, but is wholly separate from the large inflated tegumen, which latter has large rough lateral extensions. The eighth segment is not chitinized dorsally or ventrally, but has two lateral chitinizations on its inner face, ending below in hooks (*Accessory sclerite* of the figure); I can find no juxta, transtilla or gnathos, but on the other hand the saccus is longer than in any other Apatelodine. Most extraordinary of all are the valves. The main part of these, corresponding to valvula, sacculus and clasper, are reduced to two little hairy lobes, the right one subsessile, the left attached by a slender stem, and both obviously functionless rudiments; but above these there are two unsymmetrical and highly chitinized masses, attached by a broad sliding articulation to the side lobes of the tegumen, and extending up nearly to meet the sides of the uncus. The right one is broader at the base, occupying the whole midventral line, and ends ventromesally

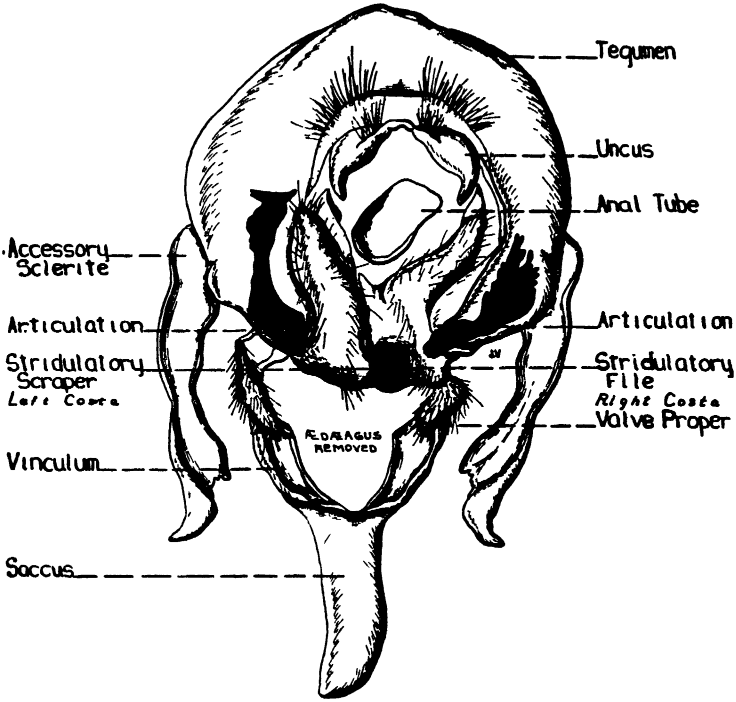



Fig. 1. Male genitalia of *Tamphana marmorea.*

in a black horizontally striated knob; while the left one overlies it, is narrower, less obviously striated (the faint striations are not shown in the figure) and ends mesally in a blunt ridge which lies on the striated area of the right one.

This has all the appearance of a stridulatory organ, with file and scraper; and we hope some good field observer in Panama or elsewhere will report on the mating behavior. The species is not too rare at Barro Colorado Island, though only males are before me.

It is also a curious problem how mating is managed in this species; the uncus and valves, which together form the usual clasping apparatus, are obviously non-functional; there is no adequate modification of the eighth segment to take their place.

I may only note that the aedeagus is tremendously developed, ending in a heavy circular hook. It would doubtless be strong enough to hold an attachment, but it is a mystery how it could be engaged and disengaged.

# Descriptions of Three New Species of Mexican Chimarrha (Trichoptera: Philopotamidae).

By Donald G. Denning, University of Minnesota, St. Paul.

In December, 1938, Mr. Janus Ridley made a short collecting trip into northeastern Mexico. While collecting in the Mexican state, Nuevo Leon, approximately 200 miles south of the Texas border, three new species of *Chimarrha* were taken. I wish to express my thanks to Mr. Nathan Banks for examining these specimens, and to Mr. Ridley for presenting them as a gift to the University of Minnesota.

**Chimarrha betteni** n. sp.

♂.—Wing expanse 13 to 16 mm. Head blackish, thorax, antennae, palpi and legs fumose. Setae of head and thorax black and light brown. Wing membranes fumose, black setae quite dense along costal portion of wings and sparsely scattered over remainder. Three hyaline areas, devoid of setae, distributed over forewings as follows: a narrow nearly straight line extending from fork of $R_{2+3}$ to $M_3$; a wide V-shaped spot, at fork of $M_{1+2}$ and $M_3$; a short narrow line just beyond tip of Anal veins. Ocelli small and inconspicuous. Second segment of maxillary palpus with a group of long stout black setae distally, extending almost two-thirds length of third segment of maxillary palpus. Spurs 1-4-4; spur of foreleg small and inconspicuous. Venation typical for genus.

Genitalia as in Fig. 1. Eighth tergite heavily sclerotized curved ventrad distally with a median laminate process extending to the cercus, curving anteriorly and fusing to the anterodorsal angle of tenth tergite, distal margin of this process much more heavily sclerotized than remainder; eighth tergite, on each side of this median process, produced caudad into a thin, flat ovate projection, bearing a few rather long setae. Sternite of ninth segment heavily sclerotized, almost completely covered by eighth sternite, ventral lamina narrowly attenuated. Ninth tergite heavily sclerotized, sickle-shaped, curved caudad distally; bearing the semi-ovate cercus along posterior margin;

entire margin of cercus and ninth tergite with a brush of dense rather long setae; proximally this tergite fused to postero-ventral angle of eighth tergite. Small ovate structure, covered with small setae, between distal end of ninth and tenth tergites, barely discernible when viewed laterally. Tenth tergite extending caudad over aedeagus, saddle-shaped, posterior margin curved dorsad about even with cercus. Clasper small, narrow, widest portion about three times width of base; ventral margin elongated dorsad into blunt finger-like projection, dorsal margin with two short blunt angulations. Aedeagus weakly sclerotized, distally two splinter-like sclerites.

♀.—Wing expanse 16 mm. Very similar in size, color and general characteristics to male.

*Holotype*—Male, Villa Allende, Nuevo Leon, MEXICO, December 6, 1938, (Janus Ridley). Deposited in University of Minnesota collection. *Allotype*—Female, same data as for holotype. *Paratypes*—2 males, same data as for holotype .

**Chimarrha ridleyi** n. sp.

♂.—Wing expanse 10 mm. Head, thorax and antennae blackish, setae of head and thorax brown; palpi and legs fumose. Wing membranes fumose, short black pubescence very sparsely scattered. Four small hyaline areas distributed over forewings as follows: a narrow line extending from fork $R_{4+5}$ to $M_{1+2}$; a rounded hyaline spot near fork of $M_{1+2}$ and $M_3$; a narrow line a short distance beyond this fork, and extending across cell $M_2$; a relatively wide line near tip of Anal veins, extending from near Cu to margin of wing. Ocelli small and inconspicuous. Second segment of maxillary palpus with a group of stout black setae distally extending almost one-fourth length of third segment of maxillary palpus. Spurs 1-4-4, spur of fore tibia relatively stout and prominent. Venation typical for genus.

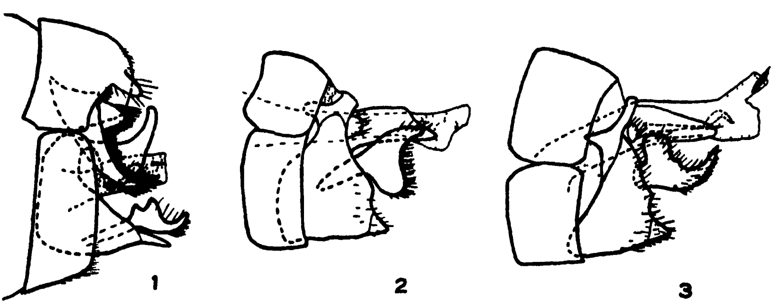
Genitalia as in Fig. 2. Ninth segment heavily sclerotized, sternite broadly triangular, proximal fifth covered by eighth segment, ventral lamina short, triangular, bearing a few, small, fine setae; dorsally ninth tergite narrowed to about one-fourth width of eighth tergite, along lateral margin an anteriorly directed blunt angulation. Tenth tergite relatively simple, composed of a pair of narrow plates, extending caudad about two-thirds length of aedeagus, postero-ventral corner shortly attenuated; dorso-distal portion with a small, wide, flattened triangular projection; distally tenth tergite weakly sclerotized. Small rounded clasper, base of tenth tergite, bears a few long

fine setae. Clasper with base narrow, greatly widened distally, postero-dorsal corner elongated dorso-caudad; postero-ventral corner blunt, directed ventrad; distal margin serrate, it and rounded ventral margin bearing fairly long, fine, light-colored setae, concave inner surface with no setae.

*Holotype*—Male, Villa Allende, Nuevo Leon, MEXICO, December 6, 1938. (Janus Ridley). Deposited in University of Minnesota collection.

**Chimarrha pylaea** n. sp.

♂.—Wing expanse 12 mm. Head and thorax blackish, antennae black, palpi and legs fumose. Setae of head and thorax dark brown. Wing membranes fumose, covered with short black sparse pubescence. Five small hyaline areas, all devoid of setae, distributed over the forewing as follows: a small spot along $R_1$ near fork of $R_{2+3}$ and $R_{4+5}$; a narrow line extending from fork $R_{4+5}$ to $M_{1+2}$; a small round spot at fork of $M_{1+2}$ and $M_3$; a narrow line, just beyond this fork extending from $M_{1+2}$ across to $M_3$; a fairly wide line near tip of Anal veins extending from near Cu to margin of wing. Ocelli small and inconspicuous. Second segment of maxillary palpus with a group of stout black setae distally, extending slightly less than one-fourth length of third segment of maxillary palpus. Spurs 1-4-4; spur of fore tibia relatively stout and prominent. Venation typical for genus.




Terminalia of males of *Chimarrha,* left lateral views: 1. *Ch. betteni* n. sp., 2. *Ch. ridleyi* n. sp., 3. *Ch. pylaea* n. sp.

Genitalia as in Fig. 3. Sternite of ninth segment heavily sclerotized, ventral lamina short, triangular, directed slightly dorsad, a few fine setae present, dorsally ninth tergite narrowed to about one-tenth width of eighth tergite, lateral margin with an acute angulation directed anteriorly. Clasper convex, pos-

tero-ventral angle fingerlike, curved dorsad, almost reaching ventral margin of aedeagus; proximo-dorsal angle wide, blunt, directed dorsad; viewed laterally two small teeth along distal margin; mesal margin serrate entire length. Convex outer surface with a few fine setae along margins, concave inner surface with no setae. Tenth tergite a thin narrow plate, gradually tapering ventro-caudad, extending caudad about two-thirds length of aedeagus; proximal half of plate moderately sclerotized, distal half only weakly sclerotized. Small rounded cercus, at base of tenth tergite, bearing a few long fine setae. Distal portion of aedeagus with a dorso-caudad directed lobe, bearing a small splinter-like sclerite.

*Holotype*—Male. Monterey, MEXICO, December 4, 1938, small stream, (Janus Ridley). Deposited in University of Minnesota collection.

**Cardinal Feeding on a Mantid (Orthoptera: Mantidae).**

Early in the morning of October 19, 1940, a cold day (26°F. at 6 A. M.), I saw a male cardinal on the porch, under an arborvita tree, apparently eating leaves and white fruits of a silver lace vine which had been left on the floor when the vine was cut back for the winter. After close watching I saw that the "green leaves" were the front wings of a mature mantid (*Paratenodera sinensis*) and the "white fruits" were bits of the internal organs. All four wings in turn were picked up and passed through the bill from side to side, beginning at the thin outer edge and working toward the base, in such a way that the bird seemed to be squeezing out any substance that could be extracted. The base of the wing was "nibbled" thoroughly and then the wing was tossed aside. Between dealing with wings, the bird ate most of the thorax, discarding the tougher chitin of the back, and the femora of most of the legs. He then started on the abdomen and dragged out the contents bit by bit until he had consumed at least half. By that time the bird was obviously "stalled" and he would eat a bit, then sit back and wait until he was able to take another beakful. Finally he had to give up and leave the rest for another time—which never came as we gathered up the fragments.

I did not see the beginning of the feast so I do not know if the bird caught the mantid or found it dead. If the latter, it must have just died as it was flexible and juicy—AMELIA S. CALVERT, Cheyney, Pennsylvania.

# Current Entomological Literature

**COMPILED BY V. S. L. PATE, L. S. MACKEY and J. W. CADBURY.**

Under the above head it is intended to note papers received at the Academy of Natural Sciences of Philadelphia pertaining to the Entomology of the Americas (North and South), including Arachnida and Myriopoda. Articles irrelevant to American entomology will not be noted; but contributions to anatomy, physiology and embryology of insects, however, whether relating to American or exotic species will be recorded.

This list gives references of the current or preceding year unless otherwise noted. All continued papers, with few exceptions, are recorded only at their first installment.

For records of Economic Literature, see the Experiment Station Record, Office of Experiment Stations, Washington. Also Review of Applied Entomology, Series A, London. For records of papers on Medical Entomology, see Review of Applied Entomology, Series B.

**Note.** References to papers containing new forms or names not so stated in titles are followed by (*); if containing keys are followed by (k); papers pertaining exclusively to neotropical species, and not so indicated in the title, have the symbol (S) at the end of the title of the paper.

**The figures within brackets** [ ] refer to the journal in which the paper appeared, as numbered in the list of Periodicals and Serials published in our January and June issues. This list may be secured from the publisher of **Entomological News** for 10c. The number of, or annual **volume**, and in some cases the part, heft, &c., the latter **within** ( ) follows; then the pagination follows the colon :

**Papers published in the Entomological News are not listed.**

**GENERAL.—Alexander, C. P.**—Records and descriptions of North American crane-flies. [119] 24: 602-644, ill. **Anders, C.**—Living aerials. [Nat. Mag.] 34: 94-96, ill. **Anon.**—A new entomologist joins Ward's staff. [118] 14: 1-2, ill. **Anon.**—Collections of insects for illustrating important biological concepts. [118] 14: 9-10, ill. **Fletcher, F. C.**—Collecting and preservation of Coleoptera. [118] 14: 8-9, ill. **Ruediger, E.**—Insekten als krankheitsüberträger. [Ent. Jahr.] 1938-39: 149-160. **Schtepetilnikova, V. A.**—For the ecology of the Azof-Black Sea race of Trichogramma evanescens. [Bull. Plant Protection USSR] 1940: 161-165. **Teale, E. W.**—The Golden Throng. Dodd, Mead & Co. 1940. 208 pp., ill. **von Tunkl, F. F.**—Bemerkungen über die art der fundortangaben vom wissenschaftlichen standpunkt. [Ent. Jahr.] 1938-39: 113-120, ill.

**ANATOMY, PHYSIOLOGY, ETC.—Fallis, A. M.**—(see under Diptera). **Hollick, F. S. J.**—(see under Diptera). **Huzimatu, K.**—The life history of a new cynipid fly, Kleidotoma japonica. [Sci. Rep. Tohoku Imp. Univ.] 15:457-480, ill. **Mitchell, R. T.**—The alimentary tract of Vespula maculifrons (Vespid.). [43] 41: 29-38, ill. **Sidorovnina, E.P.**—On the hibernation of the egg-parasite of the bug (Eurygaster integriceps) Microphanurus semistriatus. [Bull. Plant Protection USSR] 1940: 183-184. **Tsuda, M.**

—Metamorphose von Glyphotaelius admorsus. [Annotationes Zool. Japonenses] 19: 195-197, ill.

/ ARACHNIDA AND MYRIOPODA.—**Strelnikov, I. D.** —Heat production by movement and its importance in the ecology of nocturnal butterflies. [Izvestiia Nauchwoo Inst.] 23: 293-338.

THE SMALLER ORDERS OF INSECTS.—**Carpenter, F. M.**—A revision of the nearctic Hemerobiidae, Berothidae, Sisyridae, Polystoechotidae and Dilaridae. [Pro. Amer. Acad. Arts & Sci.] 74: 193-280, ill. **Carriker, M. A., Jr.**—Studies in neotropical Mallophaga—Part II. New genera and species. [Lloydia] 3. 281-300, ill. **Hubbard, C. A.**—A review of the fleas of the genus Meringis with two new species. [Pacific Univ. Bull.] 37: 4 pp., ill. A review of the western fleas of the genus Malaraeus with one new species. and the description of a new Thrassis from Nevada. [Pacific Univ. Bull.] 37: 4 pp., ill. A check list of the fleas of the Pacific Northwest. [Pacific Univ. Bull.] 37: 4 pp. **Montgomery, B. E.**—A revision of the genus Diastatops (Libellulidae) and a study of the leg characters of related genera. [Lloydia] 3: 213-280, ill. **Yoshi, R.**—On some Collembola from Hokkaido. [Annotationes Zool. Japonenses] 19: 185-190, ill.

ORTHOPTERA.—**Rehn, J. A. G.**—On the species of the genus Camposia (Acridid. Cyrtacanthacrid.). [Notulae Naturae] No. 68: 11 pp., ill. (ks*). **Urquhart & Corfe.**—The European praying mantis (Mantis religiosa) in Ontario. [Canadian Field-Nat.] 54: 130-132, ill.

HEMIPTERA.—**da Costa Lima, A.**—Insetos do Brasil. Hemipteros. Volume 2. 1940. 351 pp., ill. (k). **Novopolskaia, E.**—New*data concerning the biology of the apple sucker in the Crimea. [Bull. Plant Protection USSR] 1940: 96-98. **Snipes. Carvalho & Tauber.**—Biological studies of Ornithocoris toledoi, the Brazilian chicken bedbug. [Iowa State Coll. Jour. Sci.] 15: 27-37, ill.

LEPIDOPTERA.—**Bell, E. L.**—A new genus and some new species of Hesperiidae from Peru, in the Bassler Collection. [40] No. 1094: 7 pp., ill. **Bobinskaia, S. G.**—Basic ecological factors regulating the increase of Polychrosis bortana in Kakhetia. [Bull. Plant Protection USSR] 1940:

78-86. **Clark, A. H.**—Butterflies of Farmville, Virginia. [91] 31: 38-40. **Davenport, D.**—The butterflies of the satyrid genus Coenonympha. [Bull. Mus. Comp. Zool. Harvard Coll.] 87: 215-349, ill. **Kotzsch, H.**—Das präparieren der Schmetterlinge. [Ent. Jahrb.] 1938-39: 5-15. ill. **Miller, H. D. O.**—Observations on sod web-worms (Crambus spp.) in Kansas. [Trans. Kansas Acad. Sci.] 43: 267-281, ill.

**DIPTERA.—Bequaert, J.**—Notes on Hippoboscidae 17. The Hippoboscidae of the Antilles. [115] 19: 305-327. **Cope, O. B.**—The morphology of Esthiopterum diomedeae (Mallophaga). [117] 5: 117-142, ill. **Fallis, A. M.**—Studies on Oestrus ovis. [Can. Jour. Res.] 18: 442-446, ill. **Hollick, F. S. J.**—The flight of the dipterous fly Muscina stabulans. [Philosoph. Trans. Ry. Soc. Lond.] (B), 230: 357-390, ill. **Rubcov, I. A.**—Geographical expansion and evolution of gadflies in connection with the history of their hosts. [Priroda] 1940, No. 6: 48-60, ill. **Seevers, C. H.**—New Termitophilous Diptera from the neotropics. [Zool. Ser. Field Mus. Nat. Hist.] 24: 175-193, ill. **Alexander, C. P.**—See General.

**COLEOPTERA—Blaisdell, F. E.** — A monographic study of the species belonging to the melyrid genus Tricho chroides. [1] 66: 283-306, ill. Studies in the Melyridae. No. 12. [1] 66: 319-324. **Murayama, J.**—Nouvelle note sur les Scolytides du Manchoukuo. [Annot. Zool. Japon.] 19: 229-237.

**HYMENOPTERA.—Linsley, E. G.**—A revision of the genus Oreopasites (Nomadid.). [1] 66: 307-318, ill. **Mitchell, R. T.**—(See under Anatomy). **Rees & Grundmann.**—A preliminary list of the ants of Utah. [Bull. Univ. Utah] 31: 11 pp. **Snodgrass, R. E.**—The male genitalia of Hymenoptera. [Smiths. Misc. Coll.] 99: 86 pp., ill.

**SPECIAL NOTICES.—Synonymic list of** butterflies of Korea. By D. M. Seok. Korea. 1939. 391 pp., ill.

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THE LOUSE, AN ACCOUNT OF THE LICE WHICH INFEST MAN, THEIR MEDICAL IMPORTANCE AND CONTROL. By PATRICK A. BUXTON, M. A., M. R. C. S., L. R. C. P., D. T. M. & H., Director, Department of Medical Entomology, London School of Hygiene and Tropical Medicine, Professor of Medical Entomology, University of London. A William Wood Book. The Williams and Wilkins Co., Baltimore, 1940. 8¾ x5½ inches,

pp. ix, 115, 5 tables, 28 text figures, $3.00.—The author, writing in November, 1939, says in the preface: "At the present moment the control of the louse has become extremely important in civil as well as military life. It may therefore be of service to publish an account of the insect, its relations to disease and the methods that may be used for controlling it. The present book was originally written as part of a larger work on medical entomology which is in preparation. It was designed for readers with some knowledge both of entomology and medicine: I trust that it has now been made comprehensible to those who lack the one or the other."

A better general description of the book could hardly be written. It is full of valuable information and data of all kinds. It should be most useful to physicians, nurses and sanitation entomologists working in the war zone and of value to all students wishing a concise yet comprehensive summary to date of our knowledge of these insects and their relation to medicine, as well as to any intelligent layman who may have reason to use it. Essentially a highly concentrated compilation of data and results of responsible work on the louse, its biology and medical importance, much that is inconclusive has been omitted from text and bibliography. The student is thus saved the labor of sifting the literature for himself.

The author justifiably devotes only the first 22 pages to the zoological position of the Anoplura and the external and internal anatomy of *Pediculus humanus*. The next 30 pages are concerned with the individual and collective biologies of head and body lice. Twenty-seven more have reference to the medical importance of *P. humanus* with full discussions of the entomology of Typhus, Trench and Relapsing fevers together with development of their causative organisms while in the body of the louse and the methods by which they are transmitted to man. Ten full pages on control followed by six on all aspects of *Phthirus pubis*, and an appendix of 5 pages on methods of rearing and artificially feeding lice for experimental purposes complete the main text. There are 7 pages of references and an adequate index.

There is nothing superfluous in the book, yet Mr. Buxton avoids condensing his material to the point of unreadability. Moreover, the selection of illustrations, graphs and tables seems most fortunate and should be very helpful if only because they are brought together in one volume. Helpful too are the cross references in the text to figures, other sections of the book and bibliography, and the citation of all temperature read-

ings in both Fahrenheit and Centigrade scales. Finally, it seems to this reviewer that the author has succeeded admirably in making the volume intelligible to either a medical student or an entomologist.

Perhaps the only disappointing feature is the short treatment accorded *Phthirus pubis.* Although not as important medically, or as thoroughly studied biologically, as *Pediculus humanus,* very brief accounts of this species are the rule in most reference works. Undoubtedly Mr. Buxton has felt justified in reducing his discussion of the crab-louse, but in comparison with the rest of the text, this section seems to be somewhat less comprehensive.

The total content and its arrangement, together with its convenient size will combine to make this book a most valuable tool in the hands of medical and entomological workers. Perhaps it is not too bold to suggest that for these very reasons it may make a great contribution toward controlling major outbreaks of lice and louse-borne diseases in war ravaged Europe. If the years to come prove this to be so, Mr. Buxton will have performed a service for which humanity itself can be profoundly grateful.—John W. Cadbury, 3rd.

## OBITUARY

We regret to record the deaths of the following Entomologists, of whom we hope to give longer notices in future issues:

Dr. Charles Wardell Stiles, author of papers on ticks, and long secretary of the International Commission on Zoological Nomenclature, on January 24;

Charles William Leng, prominent Coleopterist and Director of the Public Museum of Staten Island, New York, on January 25;

Dr. Levi W. Mengel, Lepidopterist, Director emeritus of the Reading, Pennsylvania, Museum and Art Gallery, on February 3;

Samuel Henshaw, Coleopterist, Director emeritus of the Museum of Comparative Zoology at Harvard University, on February 5.

ENTOMOLOGICAL NEWS

Vol. LII APRIL, 1941 No 4.

# Take Offs by Prey-Laden Wasps (Hymen.: Pompilidae?, Sphecidae).

By W. V. Balduf, University of Illinois, Urbana.

In the summer of 1939, I chanced to observe two isolated instances that indicate certain predatory wasps at least occasionally ascend on foot to some elevated vantage point in order to take off by flight when burdened heavily with paralyzed prey they are in the process of transporting to their nesting sites. No effort has been made to review the similar cases that have doubtlessly been recorded in the literature.

The first instance involved a rather large black wasp that resembled a pompilid in general appearance, and a medium-sized green adult tettigoniid orthopteran. In the brief glance afforded me, I was unfortunately not able to identify either predator or prey more fully. It was about 5:00 P. M., of August 8 and on the back porch of my mother's home at Oak Harbor, Ohio, that I happened upon the wasp standing on the porch floor astride the long-horn. Presumably the hopper had been seized in the honeysuckle vines that decorated the adjacent end of the porch, for tettigoniid stridulations had emanated from this growth on previous days.

When first seen, the wasp had already chewed a hole through the vertex of the captive's head and stood feeding from the perforation. But in a few seconds, she started gingerly toward the wooden porch post four feet away, and upon reaching it climbed approximately four feet vertically on it, remaining astride the victim all the time as she proceeded. From this high point she took off through the air without further delay, and, carried by a stiff wind attained an elevation of about 15 feet just before she disappeared beyond my vision.

The second instance was observed as I walked through the campus woods of the University at 7:45 A. M., of August 1. There I came across a cicada-killing wasp, *Sphecius speciosus*

(Dru.) in possession of an already inactivated large green cicada, probably *Tibicen linnei* (Sm. and Grosb.). Curious to learn what was to happen next, I came to a stop not more than two feet from where the wasp stood over her prey. In a moment, *speciosus,* standing astride of and dragging her catch, proceeded toward me and climbed at once upon my left shoe, then successively up the outside of a trouser leg, over the shirt front and a shoulder, and around the back of the neck to the top of the head. Whereas the horizontal approach to the shoe was made slowly, the vertical climb was accomplished with a burst of speed that recalled the sudden response made by an airplane when the accelerator is pushed quickly down for the take off. The ascent to the height of six feet and three inches was therefore completed in only a few seconds. From that more advantageous elevation, *speciosus* promptly zoomed away among the trees with her load, and was gaining elevation slowly as she faded from view.

In order to determine the approximate carrying power of this wasp during flight, I weighed a female freshly killed in a cyanide jar and two females of *Tibicen linnei* that had probably fallen dead out of trees on the day they were found. One of the cicadas weighed 1.4 grams, the second 2.1 grams, whereas the wasp balanced the chinomatic scale at 0.3536 gram. *Sphecius speciosus* is therefore probably capable of flying a prey load four to six times greater than her own weight to her nesting site.

In most cases, the cicada killer presumably overcomes her captives where she catches them in trees and would therefore usually not be obliged to ascend on foot to some vantage point in order to take off. In their struggle with the living cicadas, some *speciosus* probably chance to fall to the ground, as may have been true in the instance described above. Although possibly exceptional, this case is nevertheless of interest in showing that such accidents need not frustrate the wasp in her activity of provisioning her nest.

# A Bibliography of Keys for the Identification of Immature Insects. Part II. Odonata.

By WM. P. HAYES.

(Continued from page 69.)

NEEDHAM, J. G. 1897. Preliminary studies of N. American Gomphinae. *Can. Ent.*, 29 (7): 164-168, (8): 181-186, pl. 7. (Key to genera, pp. 167-168).

ID. 1903. Aquatic insects in New York State. Life histories of Odonata Suborder Zygoptera Damselflies, *N. Y. State Mus. Bull.* 68: 218-276, figs. 3-17, pls. 5, 11-19. (Key to families, subfamilies, genera and species.)

ID. 1918. Aquatic insects. In Ward and Whipple, Fresh Water Biology. Wiley and Sons, N. Y., 1918. pp. 876-946. (Key to genera, p. 928-932.)

ID. 1930. A Manual of the dragonflies of China. A monographic study of the Chinese Odonata. *Zool. Sin.* (A) 11 (1): 1-344, Index 1-11, pls. I-XX. (Many keys to nymphs as far as genera throughout the book, to spp. of *Libellula*, p. 124, *Orthetrum*, p. 129, and *Rhyothemis*, p. 141.)

NEEDHAM, J. G. and BETTEN, C. 1901. Aquatic insects in the Adirondacks. *N. Y. State Museum Bul.*, 47. Odonata: 429-540. (Various keys mostly to genera).

NEEDHAM, J. G. and FISHER, E. 1936. The nymphs of North American Libelluline Dragonflies. *Trans. Am. Ent. Soc.* 62: 107-116, pls. vi, vii. (Key and verification table to genera, pp. 113-115.)

NEEDHAM, J. G. and GYGER, M. K. 1937. The Odonata of the Philippines. *Philip. Jl. Sci.* 63 (1): 21-101, 10 pls. (Many keys to nymphs of Anisoptera as far as genera throughout the paper.)

ID. 1939. The Odonata of the Philippines, II. Suborder Zygoptera. *Philip. Jl. Sci.* 70 (3): 239-314, pls. 11-22, 2 figs. (Keys to nymphs as far as genera, pp. 244-260.)

NEEDHAM, J. G. and HART, C. A. 1901. The dragonflies (Odonata) of Illinois. Part I. Petaluridae, Aeschnidae and Gomphidae. *Ill. State Lab. Nat. Hist., Bul.* 6: (1) 1-94, pl. 1. (Keys to families, genera and spp.)

NEEDHAM, J. G. and HEYWOOD, H. B. 1929. A handbook of the dragonflies of North America, vii, 378 pp., many figs. Thomas Co., Springfield, Ill. (Many keys as far as genera, many tables to spp. throughout the book.)

NEEDHAM, J. G. and NEEDHAM, P. R. 1927. Guide to the study of fresh water biology, 88 pp. Amer. Viewpoint Soc., N. Y. (Key to genera, pp. 14-20, pls. 4-7.)

NEVIN, F. R. 1929. Larval development of *Sympetrum vicinum* (Odonata: Libellulidae). *Trans. Amer. Ent. Soc.* 55: 79-102. (Key to instars of this species, p. 100.)

ID. 1930. A study of the larva of *Calopteryx* (*Agrion*) *maculata*. *Trans. Amer. Ent. Soc.* 55: 425-448, pl. xvii. (Key to instars, p. 446.)

NUNNEY, W. H. 1894. Larvae-nymphs of British dragonflies. *Science Gossip* (n. s.) 1 (4): 80-82, 3 figs.; (5): 100-102, figs. 1-5; (6): 129-131, figs. 7-15; (7): 148-150, figs. 16-26; (8): 176-177. (No keys, but diagnostic synopsis of 30 spp., pp. 176-177.)

PETERSON, ALVAH. 1939. Keys to the orders of immature stages (exclusive of eggs and pronymphs) of North American insects. *Ann. Ent. Soc. Amer.* 32 (2): 267-278. (Keys leading to Odonata, pp. 268-270.)

PULKKINEN, A. 1927. Über die Larven einiger Odonaten III. *Notulae entom.* 7: 11-12. (Keys to 3 spp. of *Leucorrhinia* and 7 spp. of *Sympetrum* of Finland.)

RIS, F. 1909. Die Süsswasserfauna Deutschlands. Odonata. Jena. Heft 9, pp. 1-67, 79 figs. (Keys to genera and some species, pp. 44-65).

ID. 1911. Uebersicht der Mitteleuropäischen Corduliinen-Larven. *Mitt. Schweiz. Ent. Ges.*, 12 (2): 25-41, 3 figs. (Key to genera and some species, pp. 27-28).

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ID. 1921. The Odonata or Dragonflies of South Africa. *Ann. S. Afric. Mus.* 18 (3): 245-452, pls. v-xii, 6 figs. (No S. African larvae, except that of *Chlorolestes,* are described

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## Two New Texas Buprestidae (Coleoptera).

By JOSEF N. KNULL, The Ohio State University, Columbus.

**Acmaeodera gillespiensis** n. sp.

♀.—Slightly more robust than *A. obtusa* Horn., but of same general form. Head, pronotum and ventral surface bronze, elytra dark blue with yellow markings as follows: basal three-fourths of sides of pronotum, an irregular transverse basal band exclusive of umbone and scutellar regions, an irregular transverse median band, also one on apical fourth and one at apex, none of bands touching suture.

Head with slight frontal depression; surface densely coarsely punctured, punctures separated by fine lines, densely pubescent; antennae reaching to middle of pronotum when laid along side, serrate from the fifth joint.

Pronotum convex, two median depressions and a basal depression each side; margins entire, not visible from above; wider at base than in front, widest in middle; sides broadly rounded; surface densely coarsely punctured, punctures larger than on head, a transverse basal corrugated stripe, pubescence dense. Scutellum not evident.

Elytra at base same width as base of pronotum, wider than pronotum just back of base which is widest point; sides expanded back of base, constricted in front of middle, widened back of middle, broadly rounded to rounded apices, apical margins serrate; disk somewhat flattened, with depression at scutellum, first and third costae raised; surface deeply, coarsely, densely punctured, punctures arranged in rows, separated by less than their own diameters, interspaces with finer punctures, pubescence not dense.

Abdomen beneath coarsely densely punctured, pubescent, last ventral without carina. Prosternal margin straight, not reaching front angles.

Length 10.3 mm.; width 4 mm.

*Holotype* female collected in Gillespie County, TEXAS, June 20, 1940, by D. J. and J. N. Knull, in collection of writer.

According to Fall's key* this species would come under the truncate group and should stand next to *obtusa* Horn. It is distinguished by the large densely placed punctures of the pronotum, much larger punctures of elytra, lack of carina on last ventral, raised third costa and very sinuate elytral margin when viewed from the side.

Mr. M. A. Cazier kindly compared the specimen with the type of *A. perforata* Caz.

**Cinyra roburella** n. sp.

♂.—Larger and more robust than *C. gracilipes* (Melsh.), pronotum and elytra dark bronze, head, ventral area and legs cupreous, more shining than above.

Head convex, a median line extending from pronotum one-third down front; surface rugose on front, with irregular smooth callosities, median one prominent, vertex finely punctured, pubescent; clypeus deeply emarginate; antennae reaching to extreme hind angles of pronotum when laid along side margins, scape stout, second joint twice as long as wide, third

* H. C. Fall, N. Y. Ent. Soc., V. 7, pp. 1-37, 1899.

joint longer than scape, fourth joint longest, following joints decreasing in length, joints four to eleven inclusive flattened, serrate.

Pronotum broader than long, widest at base, constricted at apex; sides broadly rounded in front, subparallel at base; disk convex, a transverse basal depression, faint median depression and lateral depression on each side, small pit in front of scutellum; lateral marginal carina extending nearly to front; surface confluently punctured, punctures larger than on vertex, pubescence lacking. Scutellum triangular, concave, glabrous.

Elytra wider than pronotum, widest back of middle; sides rounded in front, constricted at middle, broadly rounded posteriorly, apices truncate; disk convex, with irregular depressions; surface irregularly costate, densely punctured, punctures smaller than on pronotum, pubescence very short, inconspicuous.

Abdomen beneath densely punctured, pubescent; last abdominal truncate, outer angles produced. Posterior tarsi shorter than tibiae.

Length 16.3 mm.; width 5.5 mm.

♀.—Differs from male by antennae reaching just past middle of pronotum.

*Holotype* male collected from oak in the Davis Mountains, TEXAS, July 4, 1936, by the writer. In addition to the holotype, allotype and paratypes in collection of the writer from the same locality bearing dates June 13 to Aug. 20, collected by D. J. and J. N. Knull. Paratype labeled Chisos Mtns., Tex. July 17, H. A. Wenzel, in the Wenzel Collection at The Ohio State University.

This species should stand next to *C. gracilipes* (Melsh.) according to Chamberlin's key.** However it differs by being more robust, dull, and having a convex pronotum, more densely punctured dorsal surface and by structure of the male genitalia.

The writer is indebted to Mr. W. S. Fisher for comparing the species with the Schaeffer types.

** W. J. Chamberlin, Ent. News, V. 31, pp. 211-244, 1920.

# A Preliminary List of the Culicidae of Michigan Part I. Culicinae (Diptera).*

By WILLIAM H. IRWIN.

This paper presents a list of the Culicidae, subfamily Culicinae, and the names of the counties of Michigan from which the author has records. Previously published records are included. This list includes 18 species new for the state and extends the knowledge of distribution of the previously reported species. This study was based upon a total collection of approximately 33,000 specimens of which about 15,000 are larvae and the remainder adults. Six hundred thirty specimens were loaned to the author from the collections of the Department of Entomology, Michigan State College, by Professor E. I. McDaniel. Also the writer had the privilege of examining a collection of 300 specimens made by C. W. Sabrosky, Michigan State College, and another of about 80 specimens made by R. R. Dreisbach, Midland, Michigan. All others were collected by the writer. Most of the collections by the author were made in the years 1935-1939. Every species included in this list is represented by specimens in the writer's collection. The names used are those employed by Edwards (1932).

1. AEDES ABORIGINIS Dyar. Five females collected from Cheboygan County.

2. AE. AURIFER (Coquillett). Cheboygan and Emmet Counties. Also reported for Michigan by Matheson, 1924.

3. AE. CAMPESTRIS Dyar and Knab. One female collected by R. R. Dreisbach in Midland County, 1937.

4. AE. CANADENSIS (Theobald). Algers, Cheboygan, Emmet, Genesee, Luce, Washtenaw, Wayne and Wexford Counties. Also reported for Michigan by Matheson, 1924.

5. AE. CINEREUS Meigen. Cheboygan, Crawford, Emmet, Ingham, Midland, Presque Isle, and Washtenaw Counties.

6. AE. COMMUNIS (DeGeer). Algers, Cheboygan, Emmet, Luce, and Washtenaw Counties. Also reported for Michigan by Matheson, 1924.

* Contribution from the Biological Station and the Department of Zoology, University of Michigan.

7. AE. DIANTAEUS Howard, Dyar and Knab. Cheboygan County.

8. AE. EXCRUCIANS (Walker). Alpena, Berrien, Calhoun, Cheboygan, Emmet, Ingham, Kent, Keweenaw (Isle Royale), Lapeer, Leelanau, Livingston, Luce, Midland, Tuscola, and Washtenaw Counties. Also reported for Michigan by Matheson, 1924.

9. AE. FITCHII (Felt and Young). Algers, Alpena, Berrien, Cheboygan, Emmet, Ingham, Keweenaw (Isle Royale), Lapeer, Livingston, Luce, Midland, Montcalm, Presque Isle, Roscommon, Tuscola, Washtenaw, and Wayne Counties. Also reported for Michigan by Matheson, 1924.

10. AE. FLAVESCENS (Müller). Cheboygan, Ingham, and Midland Counties.

11. AE. IMPIGER (Walker). Algers, Cheboygan, and Washtenaw Counties.

12. AE. IMPLACABILIS (Walker). Cheboygan County.

13. AE. INTRUDENS Dyar. Algers, Cheboygan, Emmet, Ingham, Keweenaw (Isle Royale), Luce, Mackinac, Midland, Presque Isle, Roscommon, Washtenaw, Wayne, and Wexford Counties. Also reported for Michigan by Matheson, 1924.

14. AE. LATERALIS (Meigen). Algers, Cheboygan, and Wayne Counties.

15. AE. PULLATUS (Coquillett). Cheboygan, Midland, and Roscommon Counties.

16. AE. PUNCTOR (Kirby). Algers, Cheboygan, Emmet, and Luce Counties. Also reported for Michigan by Matheson, 1924.

17. AE. RIPARIUS (Dyar and Knab). Cheboygan and Emmet Counties.

18. AE. SPENCERI (Theobald). Cheboygan and Ingham Counties.

19. AE. STICTICUS (Meigen). Allegan, Arenac, Emmet, Luce, and Van Buren Counties. Also reported for Michigan by Matheson, 1924.

20. AE. STIMULANS (Walker). Calhoun, Cheboygan, Emmet, Ingham, Kent, Keweenaw (Isle Royale), Lapeer, Liv-

ingston, Midland, Washtenaw, and Wayne Counties. Also reported for Michigan by Pettit, 1903.

21. AE. TRICHURUS (Dyar). Cheboygan, Emmet, Lake, Midland, Oscola, and Roscommon Counties. Also reported for Michigan by Matheson, 1924.

22. AE. TRISERIATUS (Say). One specimen collected from Emmet County.

23. AE. VEXANS (Meigen). Alpena, Berrien, Cheboygan, Emmet, Genesee, Gratiot, Ingham, Kalamazoo, Kent, Washtenaw, Wayne, and Wexford Counties. Also reported for Michigan by Matheson, 1924.

24. ANOPHELES MACULIPENNIS Meigen. Cheboygan, Emmet, Genesee, Ingham, Kent, Midland, Presque Isle, Washtenaw, Wayne, and Wexford Counties. Also reported for Michigan by Pettit, 1903.

25. AN. PUNCTIPENNIS (Say). Cheboygan, Emmet, Genesee, Midland, Montmorency, Presque Isle, Washtenaw, and Wexford Counties. Also reported for Michigan by Pettit, 1903.

26. AN. QUADRIMACULATUS Say. Cheboygan, Emmet, Genesee, Ingham, Montcalm, and Washtenaw Counties.

27. AN. WALKERI Theobald. Cheboygan, Emmet, Genesee, Ingham, Kent, and Washtenaw Counties. Also reported for Michigan by Dyar, 1922.

28. CULEX APICALIS Adams. Cheboygan, Emmet, Genesee, Ingham, Wexford, and Van Buren Counties. Also reported for Michigan by Jewell and Brown, 1929.

29. C. PIPIENS Linnaeus. Cheboygan, Emmet, Genesee, Ingham, Washtenaw, Wayne, and Wexford Counties. Also reported for Michigan by Pettit, 1903.

30. C. PECCATOR Dyar and Knab. One specimen collected in Ingham County, August, 1938, by E. I. McDaniel.

31. C. SALINARIUS Coquillett. Cheboygan, Genesee, Ingham, and Midland Counties.

32. C. TARSALIS Coquillett. Cheboygan and Emmet Counties.

33. C. TERRITANS Walker. Cheboygan, Emmet, Genesee, Ingham, St. Joseph, Washtenaw, Wayne, and Wexford Coun-

ties. Also reported for Michigan by Matheson, 1924.

34. MANSONIA PERTURBANS (Walker). Cheboygan, Emmet, Mackinac, and Wexford Counties. Also reported for Michigan by Pettit, 1903.

35. PSOROPHORA CILIATA (Fabricius). Ingham, Kent, Livingston, and Wayne Counties. Also reported for Michigan by Pettit, 1903.

36. PS. FEROX (Humboldt). Collected from Ingham County, 1933. Also reported for Michigan by Pettit, 1903.

37. THEOBALDIA IMPATIENS (Walker). Cheboygan County. Also reported for Michigan by Jewell and Brown, 1929.

38. TH. INCIDENS (Thomson). Cheboygan and Emmet Counties.

39. TH. INORNATA (Williston). Cheboygan, Emmet, and Genesee Counties. Also reported for Michigan by Matheson, 1924.

40. TH. MELANURA (Coquillett). Wexford County.

41. TH. MORSITANS (Theobald). Cheboygan, Emmet, and Washtenaw Counties. Also reported for Michigan by Matheson, 1924.

42. URANOTAENIA SAPPHIRINA (Osten Sacken). Berrien, Cheboygan, and Ingham Counties. Also reported for Michigan by Pettit, 1903 and recorded for Washtenaw County by Hinman, 1935.

43. WYEOMYIA SMITHII (Coquillett). Cheboygan County. Also reported for Michigan by Matheson, 1924.

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## Notes on the Nearctic Geosarginae (Diptera: Stratiomyiidae).

By MAURICE T. JAMES, Colorado State College, Fort Collins.

In a previous paper[1] I published an account of the Nearctic Geosarginae which, in the light of further study and with the accumulation of additional information, is in need of revision. The present paper attempts to bring this review up to date.

*Revised Key to the Genera.*

1. Scutellum spined—*Nothomyia* (belongs to Stratiomyinae).
   Scutellum unspined (Geosarginae) ............... 2
2. Second segment of antennae produced into third in a finger-like process, especially visible on inner side, *Ptecticus*

[1] Canad. Ent., 47, pp. 267-275, 1935.

Second segment of antennae sometimes convex, but not produced into a finger-like process...............3

3. Eyes densely and conspicuously pilose........*Chloromyia*

Eyes bare ..........................................4

4. Anterior ocellus remote from other two by a distance much greater than length of base of ocellar triangle (except in *G. perpulcher*); distance from r-m to origin of $R_{2+3}$ greater than length of r-m..........*Geosargus*

Ocelli approximately equidistant from each other.....5

5. Abdomen relatively short and broad, much wider than thorax and (excluding segment five) no longer than broad; eyes of male contiguous, divided into definite zones of different sized facets; distance from r-m to origin of $R_{2+3}$ greater than length of r-m..........6

Abdomen barely, if any, wider than thorax, and two to three times as long as wide; eyes in both sexes separated and not divided into zones of different sized facets; origin of $R_{2+3}$, in American species known to me, before, at, or but slightly beyond r-m.........7

6. Discal cell small; posterior veins weak, evanescent toward wing margin; anal cell as broad as combined basal cells ............................*Microchrysa*

Discal cell of usual size; posterior veins evident to wing margin; discal cell wider than basal cells individually, about two-thirds their combined width,

*Cephalochrysa*[2]

7. Lower squama with a strap-like projection (Neotropical and Old World) ......................*Chrysochroma*

Lower squama without such a projection (Nearctic and Neotropical) ........................*Merosargus*

**Ptecticus trivittatus melanopus**, ssp. nov.

In all respects a typical *P. trivittatus,* except that the tarsi and the apical two-thirds of the hind tibiae are black, the front and middle tibiae are blackish anteriorly on the apical two-fifths; and each antenna bears on the inner side of the third segment a pair of black spots, one near the base of the arista, the other at the opposite apical corner.

[2] See Ent. News, 50, p. 218, 1939.

*Holotype*, ♂, Columbus, Ohio, Sept. 1, 1939 (J. Enke) Ohio State University collection.

Chloromyia formosa Scopoli. Two males, Rochester, New York, July 16, 1939 (Amer. Mus. Nat. Hist.). This is the first record in America of this common Palaearctic species.

Geosargus lucens Loew.

*Sargus lucens* Loew, 1866, Cent., VII, 11 ( ♂ ).
*Sargus tricolor* Loew, 1866, Cent., VII, 12. ( ♀ ).
*Macrosargus clavis* Williston, 1895, Canad. Ent., 17: 123 ( ♂ ; ♀ ).

A widely distributed and somewhat variable species. I have seen a female from Clarksville, Tennessee, which agrees with the form described as *tricolor*, but I believe this is merely a color variation.

Microchrysa polita L. and M. flavicornis Meig. are both widely distributed throughout the United States, but evidently neither is of common occurrence.

Cephalochrysa Kertész. To this genus belong the four species which in my previous paper I assigned to *Isosargus*.

Merosargus caerulifrons Johnson. This species, formerly placed in *Geosargus*, is a true *Merosargus*.

**Merosargus beameri**, n. sp.

♂. Head black, with a green cast, especially on the face; the vertex, post-vertical area, and middle of front as far as the frontal calli, however, metallic green; frontal calli ivory white, subinterrupted; black areas of front densely punctured. Front broadest below; ratio of vertex on posterior margin, front anterior to unpaired ocellus, and front at calli, 11: 9:11. Pile on upper part of front black and brownish-yellow intermixed, on lower part of front and face short, black; on cheeks, longer, yellow. Antennae brownish-yellow, their pile black; arista at base somewhat more blackish, thickened, and black-haired; segments subequal in length.

Thorax, except a slender notopleural margin, wholly metallic green, the dorsum, however, especially behind the suture and on the scutellum and metascutellum with a decided violet cast; dorsum with short, inconspicuous, erect, black pile and with longer, rather conspicuous, appressed yellow pile; pile elsewhere white, except on the metanotal slopes, where there is some long black pile intermixed with the more abundant white.

Legs yellow, except the last two or three segments of the front and hind tarsi, the apical three-fifths of the hind tibiae, and the apical three-fourths of the hind femora (especially above); pile in general black on black areas and also on apical segments of middle tarsi, otherwise yellow.

Halteres yellow, somewhat darkened on knob. Wings hyaline; veins brown, almost black in places; $R_{2+3}$ arising slightly beyond r-m, converging somewhat toward $R_1$ but ending independently of it.

Abdomen widening gradually to apex of fourth segment; length almost three times maximum width; color metallic green with violet reflections, unmarked with yellow except narrow base of second and narrow apex of fourth segments of venter, and genitalia, the latter wholly bright yellow; pile short, black, inconspicuous; the basal three segments, and to a much less extent the fourth and base of the fifth segments, have, in addition, on the sides of the terga a long, pale yellow pile which greatly obscures the black. Length, 8.5 mm.

*Holotype*, ♂, Baboquivari Mountains, ARIZONA, July 19, 1932 (R. H. Beamer). Snow Entomological Collection, University of Kansas.

Runs in Curran's key (Amer. Mus. Nov., 534, p. 1-2) to *cingulatus* Schiner; but the lack of extensive yellow markings will readily distinguish it from *cingulatus*, the described Mexican species not included in Curran's key, and, indeed, from most other described species of the genus. *M. caerulifrons*, which also has the unicolorous abdomen, may at once be distinguished by its yellow pleura.

## Henry Clinton Fall Memorial Publication Fund.

The Pacific Coast Entomological Society has recently received a gift of securities valued at $1000. from the estate of the late H. C. Fall, to be known as the Henry Clinton Fall Memorial Publication Fund, according to the January issue of the *Pan-Pacific Entomologist*.

## A note on Noctuid larvae found in Ant's Nests (Lepidoptera; Hymenoptera: Formicidae).

A collection of a part of a colony of *Formica rufa obscuripes* Forel, together with some of the material of the nest was made at Seattle, Washington, in March, 1939. This material, including the ants, was placed in an observation nest in the laboratory and kept for two months. The ants were given generous amounts of honey and water, as well as bits of insects for food. During this time 6 female and 4 male moths emerged from pupal cases in the rubble of the nest. Examination of the nest material revealed 12 pupal cases still occupied, and 8 larvae not yet pupated. The pupal cases of the moths were made from fragments of the nest—straw, leaves, etc., held loosely together by silk. When a newly emerged moth alighted in the nest a passing ant would attack it, but the numerous larvae and pupae were undisturbed by the ants.

Noctuids of the genus *Epizeuxis* are known to lay eggs in decaying leaves (Holland, W. J. "The Moth Book" 1937) and other forest detritus. C. V. Riley (Amer. Naturalist; vol. 17, 1883 also Insect Life; vol. 4, 1892) reports the common occurrence of the larvae of *E. americalis* Guenée in nests of *F. rufa*. Wheeler (Ants, 1910) describes the caterpillars as neutral synoeketes, obtaining their food as scavengers in the middens of the nests.

It is remarkable, however, that the adults of these moths which are evidently subject to attack by the ants, would have an opportunity to oviposit on an ant mound.

Several of the moths which emerged in the laboratory were sent to Prof. Wm. T. M. Forbes, who confirms my identification in saying that these are probably a pale western race of *Epizeuxis americalis* Guenée.—FALCONER SMITH, B-258 Biological Laboratory, Harvard University, Cambridge, Mass.

## War Damage to Entomology.

An identical note in the January, 1941, issues of the *Entomologists' Monthly Magazine* and *The Entomologist*, London, states that "Owing to enemy action almost the whole of the archives of the Society for British Entomology and practically the whole of the stock of back numbers of *Transactions* and *Journal* have been completely destroyed, including the current list of names and addresses of members." Our sympathy to our British colleagues.

# Current Entomological Literature

**COMPILED BY V. S. L. PATE, L. S. MACKEY and J. W. CADBURY.**

Under the above head it is intended to note papers received at the Academy of Natural Sciences of Philadelphia pertaining to the Entomology of the Americas (North and South), including Arachnida and Myriopoda. Articles irrelevant to American entomology will not be noted; but contributions to anatomy, physiology and embryology of insects, however, whether relating to American or exotic species will be recorded.

This list gives references of the current or preceding year unless otherwise noted. All continued papers, with few exceptions, are recorded only at their first installment.

For records of Economic Literature, see the Experiment Station Record, Office of Experiment Stations, Washington. Also Review of Applied Entomology, Series A, London. For records of papers on Medical Entomology, see Review of Applied Entomology, Series B.

**Note.** References to papers containing new forms or names not so stated in titles are followed by (*); if containing keys are followed by (k); papers pertaining exclusively to neotropical species, and not so indicated in the title, have the symbol (S) at the end of the title of the paper.

**The figures within brackets [ ]** refer to the journal in which the paper appeared, as numbered in the list of Periodicals and Serials published in our January and June issues. This list may be secured from the publisher of **Entomological News** for 10c. The number of, or annual **volume**, and in some cases the part, heft, &c., the latter **within ( ) follows; then** the pagination follows the colon :

**Papers published in the Entomological News are not listed.**

GENERAL.—**Goodnight, C. J.**—Insects taken by the southern pitcher plant. [Trans. Ill. State Acad. Sci.] 33: 213. **Hayes, W. P.**—Some recent works on the classification of immature insects. [103] 14: 3-11. **Lutz, Adolpho.**—Obituary with portrait by T. Borgmeier. [105] 11: 963-966. **McColloch, James Walker.**—Obituary by G. A. Dean. [103] 14: 1-2. **Murphy, M.**—Household Insects. [Georgia Dept. Ent.] Bull. 21: 1-39, ill. **Needham. J. G.**—Insects from the seed pods of the primrose willow, Jussiaea angustifolia. [10] 43: 2-6, ill. **Pinto, C.**—(See under Diptera). **Plaumann, F.**—Ueber das Sammeln im brasilianischen Urwald. [105] 11: 908-920. **Shelford & Twomey.**—Tundra animal communities in the vicinity of Churchill, Manitoba. [84] 22: 47-69. ill. **Smart, J.**—Notes on the localities [in British Guiana and Trinidad] from which the Ceratopogonidae mentioned in Dr. Macfie's paper were taken. [107] A, 9: 194-195. **Smart, J., et al.**—Instructions for Collectors. No. 4a. Insects. vi + 164 pp., ill. London, British Mus. (Nat. Hist.). **Spencer, J. G.**—The control of human lice under war conditions. [4] 73: 20. **Travassos, L., et al.**—Relatorio da excursao cientifica do Instituto Oswaldo Cruz realizada na zona da Estrada de Ferro Noroeste do Brasil, em outubro de 1938. [Bol. Biol., Brasil] 4 (1939): 208-315, ill.

**ANATOMY, PHYSIOLOGY, ETC.—de Beaumont, J.** —Le determinisme des metamorphoses chez les Insectes (Hormones de metamorphose). [41] 18: 49-57. **Bolwig, N.**—The reproductive organs of Scatophila unicornis (Diptera). [107] A, 15: 97-102, ill. **Bouvier, G.**—Note sur l'Armature genitale des Tabanides. [41] 18: 57-61, ill. **Burt, E. T.**—A filter-feeding mechanism in a larva of the Chironomidae (Diptera). [107] A, 15: 113-121, ill. **Cope, O. B.**—The morphology of Esthiopterum diomedeae (Mallophaga). [117] 5: 117-142, ill. **Eltringham, H.**—The larval gland in Lachnocnema bibulus (Lepidoptera: Lycaenidae). [36] 90: 452-453, ill. **Fox, I.**—The Siphonapteran thorax. [10] 43: 6-10, ill. **Fraser, F. C.**—A comparative study of the penes of the family Gomphidae (Odonata). [36] 90: 541-550, ill. **Mitchell, R. T.**—The alimentary tract of Vespula maculifrons (Hymen.: Vespid.). [43] 41: 29-38, ill. **Pereira, C.**—Sobre a diafanizacao dos artropodos. [105] 11: 642-644. **Pickel, D. B.**—Dermatite purulenta produzida por duas especies de Paederus (Col.: Staphylinid.). [105] 11: 775-793. **Pickles, W.**—Fluctuations in the populations, weights and biomasses of ants at Thornhill, Yorkshire, from 1935-1939. [36] 90: 467-485. **Salt, G.**—Experimental studies in insect parasitism. VII: The effects of different hosts on the parasite Trichogramma evanescens (Hymen. Chalcid.) [107] A, 15: 81-95, ill. **Stahel & Geijskes.**—Observations about temperature and moisture in Atta nests (Hymen: Formicidae). [105] 11: 766-775, ill. **Stanley, J.**—A mathematical theory of the growth of populations of the flour beetle Tribolium confusum. IV: A modified theory descriptive of the relations between the limiting value of egg-populations in the absence of hatching, and the volume (or weight) of flour used in the culture. [84] 22: 23-37, ill. **Wright, G.**—Observations on the fertility of the black widow spider. [Trans. Ill. State Acad. Sci.] 33: 225.

**ARACHNIDA AND MYRIOPODA.—Buecherl, W.**—Dois novos quilopodos do subgenero Parotostigmus, da colecao do Instituto Butantan. [Bol. Biol., Brasil] 4 (1939): 444-447, ill. **Chamberlin & Ivie.**—Spiders collected by L. W. Saylor and others, mostly in California. [Bull. Univ. Utah] 31: 49 pp., ill. **Heriot, A. D.**—A new character distinguishing Tetranychus pacificus from T. telarius. (Acarina). [4] 73: 1, ill. **Jones, S. E.**—An annotated list of the spiders of an east central Illinois forest (Wm. Trelease

Woods, University of Illinois). [Trans. Ill. State Acad. Sci.] 33: 216-220. **Knight, K. J.**—Illinois distribution records of the black widow spider. [Trans. Ill. State Acad. Sci.] 33: 214-215, ill. **de Mello-Leitão, C.**—Dois gêneros e sete espécies de Goniléptidas sulamericanos. [Bol. Biol., Brasil] 4 (1939): 345-351, ill. Opiliões coligidos pelo Dr. Henry Leonardos no xingú. [Bol. Biol., Brasil] 4 (1939): 352-357, ill.

**THE SMALLER ORDERS OF INSECTS.—Arle, R.**—Novas espécies de Pseudachorutini do Rio de Janeiro e Arredores. [Bol. Biol., Brasil] 4 (1939): 67-72, ill. **Berner, L.**—Baetine mayflies from Florida. [39] 23: 33-45; 49-62, ill. (*). **Fryer & Edelsten.**—Psectra diptera (Neuroptera: Hemerobiidae) at Woodwalton Fen, Hunts. [8] 76:271. **Ross, H. H.**—N. spp. of Trichoptera from Canada and northern United States. [4] 73: 15-19, ill. **Tillyard, R. J.**—A reclassification of the order Odonata, based on some new interpretations of the venation of the dragonfly wing. Part III. Suborder Anisozygoptera. [Australian Zool.] 9: 359-396, ill. (*k). **Werneck, F. L.**—Notas sobre anopluros. [105] 11: 722-729, ill. (S*).

**ORTHOPTERA.—Burks, B. D.**—(see Hymenoptera). **Rehn, J. W. H.**—A new genus of mellierid mantid from Venezuela (Manteidae). [Notulae Naturae] No. 70: 4 pp., ill.

**HEMIPTERA.—Balduf, W. F.**—Ambush bug studies. A summary. [Trans Ill. State Acad. Sci.] 33: 206-208. **Beamer, R. H.**—Two n. sp. of Erythroneura (Cicadell.). [103] 14: 18-19. **Compere, H.**—Parasites of the black scale, Saissetia oleae, in Africa. [Hilgardia] 13: 387-425, ill. **da Costa Lima, A.**—Espécies de Pseudococcus observadas no Brasil. [Bol. Biol., Brasil] 4 (1939): 1-10, ill. **Curtiss, C.**—The alfafa plant bug, Adelphocoris lineolatus, found in Kansas. [103] 14: 25-26. **Lent & Pifano.**—Sobre a identidade dos generos Panstrongylus Berg, 1879 e Mestor Kirkaldy, 1904. Redescricao de Panstrongylus rufotuberculatus encontrado, na Venezuela, naturalmente infestado pelo Schizotrypanum cruzi. [105] 11: 629-639, ill. (S). **Lent & Viana Martins.**—Estudos sobre os Triatomideos do Estado de Minas Geraes, com descricao de uma especie nova. [105] 11: 877-886, ill. **Mendes, L. O. T.**—Dysdercus da coleção da escola nacional de Agronomia. [Bol. Biol., Brasil] 4

(1939): 98. **Monte, O.**—Sphaerocysta brasiliensis (Tingitid.). [Bol. Biol., Brasil] 4 (1939): 516-518, ill. **Sailer, R. I.**—Additional notes on Galgupha loboprostethia (Thyreocorinae). [103] 14: 19. **Usinger, R. L.**—A n. sp. of Aradus from Brazil. [105] 11: 639-642, ill.

**LEPIDOPTERA.—Bourquin, F.**—Contribution al estudio de la metamorfosis de los lepidopteros argentinos. [105] 11: 809-820, ill. **Davenport, D.**—The butterflies of the Satyrid genus Coenonympha. [Bull. M. C. Z.] 87: 215-349, ill. (b*). **Ferreira d'Almeida, R.**—Contribuicao ao estudo dos Mechanitidae. [105] 11: 758-766, ill. (S*). Revisão do gênero Appias (subgen. Glutophrissa). [Bol. Biol., Brasil] 4 (1939): 50-66, ill. Revisao do genero Aphrissa. (Pierid.). [Bol. Biol., Brasil] 4 (1939): 423-443, ill. **de Figueiredo, E. R., Jr.**—Notas sobre a Thridia themisto Huebn., 1823, praga do manaca [Bol. Biol., Brasil] 4 (1939): 512-515, ill. **Hayward, K. J.**—N. sp. of Neotropical Hesperiidae from Ecuador. [105] 11: 861-877, ill. **Jordan, K.**—Results of the Oxford University Biological Expedition to the Cayman Islands, 1938: Sphingidae. [8] 76: 275-277. **Kaye, W. J.**—Additions and corrections to the recorded species of Trinidad butterflies. [36] 90: 551-573. **Santos, N.**—Contribuiçã ao conhecimento dos Euchromiidae. [Bol. Biol., Brasil] 4 (1939): 87-97, ill. **Stallings, D. B.**—New records of Lepidoptera for Sumner Co., Kansas. [103] 14: 16. New records of butterflies for Kansas, [103] 14: 21. A freak butterfly. [103] 14: 26. **Stephan, J.**—Clothilda (Rhopal.). [18] 54: 181-184, (S). **Travassos, L.**—Contribuicao ao conhecimento dos Adelocephalidae. [105] 11: 682-690, ill. (*). Contribuicao para o conhecimento dos Euchromiidae. V. Genero Isanthrene. [Bol. Biol., Brasil] 4 (1939): 454-472, ill.

**DIPTERA.—Aitken, T. H. G.**—The gen. Psorophora in California (Culicidae). [105] 11: 672-682, ill. **Alexander, C. P.**—Further observations on the Psychodid subfam. Bruchomyinae. [105] 11: 793-799, ill. (kS*). Records and descriptions of Tipulidae from tropical America, Pt. 3. [105] 11: 894-908, ill. **Antunes & Coutinho.**—Notas sobre Flebotomos Sul-Americanos. Descricao de Flebotomus whitmani n. sp. e da armadura bucal de algumas especies. [Bol. Biol., Brasil] 4 (1939): 448-453, ill. **Antunes & Ramos.**—Culex (Carrollia) iridescens, bonnei e soperi (Culicid.). [Bol. Biol., Brasil] 4 (1939): 374-385, ill.

**Bouvier, G.**—See under Anatomy. **Callan, E. McC.**—The gall midges (Cecidomyidae) of the West Indies. [105] 11: 730-758. **Coutinho, J. O.**—Nota sôbre Flebotomos sul-americanos. [Bol. Biol., Brasil] 4 (1939): 181-183, ill. **Fairchild, G. B.**—Notes on Tabanidae from Panama. 1: The genera Chlorotabanus and Cryptotylus. [105] 11: 713-722, ill. (k). **da Fonseca, F.**—Nova especie de Oricuterebra do Brasil (Oestridae). [105] 11: 662-671, ill. (k). **da Fonseca & Ramos.**—Shannonesia nov. nom. (Culicidae). [105] 11: 966. **James, M. T.**—The robber flies (Asilidae) of Colorado. [103] 14: 27-36, (k*). **Lane, J.**—Non-hematophagous Culicidae [Bol. Biol., Brasil] 4 (1939): 386-393, ill. Notes on non-hematophagous Culicidae. [Bol. Biol., Brasil] 4 (1939): 99-113, ill. **Lane & Porto.**—Simulídeos da região neotrópica o gênero Eusimulium. [Bol. Biol., Brasil] 4 (1939): 168-176, ill. **de Leon, J. R.**—La formacion de razas en los Anopheles guatemaltecos. [121] 1: 349-352, ill. **Lopez, H. de Souza.**—Contribuicao ao conhecimento do genero Udamopyga e de outros Sarcophagideos que vivem em molluscos no Brasil. [105] 11: 924-954, ill. (k*). **Macfie, J. W. S.**—Ceratopogonidae from British Guiana and Trinidad. [107] A, 9: 179-194, ill. (*) 1. Forcipomyia furcifera sp. n. (Ceratopogonidae). [105] 11: 920-922, ill. **Morrison, F. O.**—A study of the male genitalia in calyptrate Diptera, based on the genus Gonia (Tachinidae). [Canadian Jour. Res.] 19: (Sec. D): 1-21, ill. **Needham, J. G.**—See under general. **Ouellet, J.**—Un nouveau Diptere du genre Enicita (Sepsidae). [98] 67: 225-228, ill. **Pechuman, L. L.**—A new Chrysops from Brazil (Tabanidae). [105] 11: 886-888, ill. **Philip C. B.**—Comments on the supra-specific categories of Nearctic Tabanidae. [4] 73: 2-14, (k*). **Pinto, C.**—Disseminacao da malaria pela aviacao; biologia do Anopheles gambiae no Brasil. [Bol. Biol.. Brasil] 4 (1939): 196-207, ill. **Porto, C. E.**—Simulídeos da região neotrópica (gen. Simulium). [Bol. Biol., Brasil] 4 (1939): 369-373, ill. **Shaw, F.**—Some new Mycetophilidae from Costa Rica, Pt. 1. [105] 11: 803-808, ill. **Townsend, C. H. T.**—New Oestrid flies from Brazil. [105] 11: 889-894.

**COLEOPTERA.—Balfour-Browne & Balfour-Browne.**—An outline of the habits of the water-beetle, Noterus capricornis. [107] A, 15: 105-112, ill. **Beaulne, J.-L.**—Contribution a l'etude des Coleopteres du Canada: Fam.

Haliplidae & Monotomidae. [98] 67: 303-306, (k). **Bondar, G.**—Notas entomologicas da Bahia, VI. [105] 11: 842-861, (*). **Boyer, L. B.**—A review of Hoplia surata Bates, a Central American Melolonthid (Scarab.). [105] 11: 922-924. **Denier, P. C. L.**—Description de Lytta neivai n. sp. du Bresil et notes sur quelques Lytta de l'Amerique du Sud (Meloidae). [105] 11: 799-802. **Fournier, O.**—Tricrania sanguinipennis (Meloidae) esp. nouv. pour la faune du Quebec. [98] 67: 311. **Green, J. W.**—Taxo. nomic studies in Cantharis (Cantharid.). [70] 20: 159-214, ill. (k*). An apterous female Photinus (Lampyrid.). [103] 14: 17-18, ill. **Hustache, A.**—Curculionides nouveaux du Bresil. [105] 11: 690-713. **Lane, F.**—Descrições de Longicórnios neotrópicos. [Bol. Biol., Brasil] 4 (1939): 73-78. Notas sobre Lamiideos neotropicos. [Bol. Biol., Brasil] 4 (1939): 473-479, ill. **Marshall, G. A. K.**—New Brazilian Curculionidae. [105] 11: 645-662. **Pereira, F. S.**—Duas espécies novas de Passalídios. [Bol. Biol., Brasil] 4 (1939): 79-81. **Pickel, D. B.**—See under Anatomy. **Powell, E. F.**—Relationships within the family Chrysomelidae as indicated by the male genitalia of certain species. [119] 25: 148-195, ill. **Wittmer, W.**—Erster Beitrag zur Kenntnis der neotropischen Malacodermata. [105] 11: 820-821, (*)

**HYMENOPTERA.—Araujo, R. L.**—Contribuicao para o conhecimento do genero Editha (Bembicid.). [Bol. Biol., Brasil] 4 (1939): 505-511. **Bequaert, J.**—Synopsis of Monobia, an American genus of solitary wasps. [105] 11: 822-842, ill. (k*). **Burks, B. D.**—The host of another Illinois species of Brachymeria. [Trans. Ill. State Acad. Sci.] 33: 208. **Fernald, H. T.**—A probable color dimorphism in Chlorion habenum (Sphecidae). [39] 23: 45-46. **Gahan, A. B.**—Note on a Puerto Rican sp. of Eulophidae( Chalcid.). [10] 43: 1-2. **Morley, B. D. W.**—An artificially produced multiple mixed colony of ants. [107] A, 15: 103-104 **Needham, J. G.**—See under General. **Salt, G.**—See under Anatomy. **Snodgrass, R. E.**—The male genitalia of Hymenoptera. [Smiths. Misc. Coll.] 99: 86 pp., ill. **Stahel & Geijskes.**—See under Anatomy.

**SPECIAL NOTICES.—Adaptive Coloration** in Animals. By Cott, H. B., xxxii + 508 pp., ill. Methuen & Co, London. **Insetos do Brasil.** By da Costa Lima, A., vol. 2: Hemipteros. 351 pp. Rio de Janeiro. **New Systematics.** By Huxley et al. 583 pp. Oxford, Clarendon Press.

ENTOMOPHAGOUS INSECTS By CURTIS P. CLAUSEN. First Edition McGraw-Hill Book Co., New York and London 1940 pp. x+688. 257 figures. Price $7.50. In the study of insect biology, the unusual and amazing seems almost to be the usual state of affairs; and perhaps nowhere is there a greater assemblage of remarkable adaptations, a greater variety of intricate modification of structures, developmental peculiarities and behavior than among the entomophagous insects described in this book. Most of the forms dealt with are the parasitic insects, those sometimes referred to as predaceous parasites, for the planidium larva, which pounces upon a caterpillar and proceeds to devour it or some other parasite already present, is, in a sense, also a predator. But Dr. Clausen prefers the established terminology and avoids even the term "parasitoid." Indeed, he shows little concern regarding definitions and theories for he is anxious to get on with his job, a very sizable one, that of telling us what is actually known of the biology of all the insect-eating insects. Proceeding at once with the Hymenoptera, he first makes what generalizations are possible on the habits of this group as to egg placement, feeding, sex, reproduction, phoresy and then he describes the types of immature stages, cites the effect upon the host and discusses sex ratios. There is a great deal of detailed information on numerous species—the anatomy of the larvae, their development and host relationships—all presented not as a mere compilation but in a thoroughly digested and integrated form. The many curious forms of larvae are illustrated by figures as are also representative adult types. Then follow the aculeate Hymenoptera containing both predaceous and parasitic forms as well as many that are difficult to classify. The Diptera are discussed according to the same plan as the Hymenoptera. The Lepidoptera, Coleoptera, Hemiptera and 10 smaller orders are taken up in turn; and in each case most attention is given to the forms that are most highly specialized in their host relationships. Altogether this volume will be of great value to entomologists and parasitologists, for it represents the compilation and synthesis of a great mass of information from numerous sources, including many foreign entomological and agricultural publications and reports, that is not otherwise available to the working investigator. The book will be of use also to those interested in general biological problems such as sex determination, sex ratios, reflexes, behavior, diapause, polyembryony, etc. On each of these topics there is much information included under the families concerned and so indexed, usually, rather than as first-

place index entries. The list of references, all cited in the text, takes up 47 pages. The index lists all forms mentioned, including host species.—R. G. SCHMIEDER.

/ PLANT GALLS AND GALL MAKERS by EPHRAIM PORTER FELT, Director and Chief Entomologist, Bartlett Tree Research Laboratories, etc., Ithaca, New York. Comstock Publishing Co., Inc., 1940. Pp. viii, 364, 344 text figs., 41 plates. $4.00.—Dr. Felt says in his preface: "This work is an extended revision, a rewritten version with much additional matter, of the author's 'Key to American Insect Galls' which appeared as New York State Museum Bulletin No. 200 in 1917 [1918]. The demand for the bulletin was so great that the edition was speedily exhausted." The bulletin of 1918 comprised 310 pages, including 16 plates and 250 text-figures, so that the net increase in the present volume is 62 pages. The plates in 1918 were massed near the end of the book, just before the index; here they are interspersed throughout the text. *Plant Galls and Gall Makers* is divided into two parts: I. Introduction pp. 4-35, II. Key to the galls of the various plant families pp. 37-338. Following is a bibliography pp. 339-340 and the index pp. 341-364. The introduction is much more extensive than the 14 pages similarly labeled in the 1918 bulletin, except that the tabulation of plants and American insect galls (p. 31) is a very much compressed summary of tables occupying 14 pages (215-228) in 1918. The introduction discusses galls and gall types, gall producers, injurious and valuable galls, honeydew producing galls, how galls are produced, life history of gall producers, alternation of generations*, insects and fungous galls, distribution and abundance of gall insects, gall insects in different parts of the world (especially those of Asia, the Dutch East Indies, southern Europe, middle Europe, Moravia, North, South and Central America), gall insect preferences for host plants in America, natural checks, collecting galls and studying gall insects—an interesting summary. The main body of the book, the key to the galls, follows in general the treatment of 1918, but with frequent differences in detail, or in minor sequence.

* In this section Dr. Felt remarks: "Investigations in Europe show that a relatively large number of oak gall wasps have alternating generations. There are probably more than 600 oak galls occurring upon American oaks and as yet the direct connection between the two generations has been established for relatively few." This is illustrated by his list of "The known agamic and bisexual forms of American gall wasps" (pp. 22-25) which contains 17 species and varieties.

The references to the descriptions of each gall or its maker are, however, omitted. At the head of each plant family a general discussion of its galls and gall makers has been added. Most (all?) of the illustrations of 1918 are reproduced but are often redistributed; many others, principally from the works of Kinsey and of Weld, have been added. Under "Bibliography," Dr. Felt says "The author has given an extended bibliography in his . . . Bulletin No. 200, 1918. The following is limited to the more important works which have appeared subsequently." It is composed of 18 titles from 1920 to 1938, arranged chronologically. The earlier list of 282 titles runs from 1841 to 1918. How far the present work is a betterment of its predecessor must be left to the specialists to decide, but it appears to be a very useful volume, and the bulletin of 1918 may be still be kept alongside it, for bibliographical assistance.—P. P. CALVERT.

## OBITUARY

HERMANN SCHWARZ died suddenly at Webster Groves, Missouri, on March 21, 1940. He was born in Osnabruck, Germany, March 27, 1876 and came to America when 9 years old. He was the youngest of four brothers, all naturalists. Entirely self-educated, he eventually attained to the leadership of the naturalists of St. Louis and surrounding territory. Interested in all phases of natural history, he belonged to many nature study and scientific societies, being one of the organizers of the St. Louis Naturalists Club and the St. Louis Entomological Club. In recent years he was very active in Boy Scout work, being a member of the Court of Honor and chairman of the Science Section. It was while making the awards to four Eagle Scouts that he collapsed and almost immediately afterwards died. Mr. Schwarz was in the printing business, but for a number of years conducted the Mid-West Nature Supply House as a hobby. He contributed the following articles to ENTOMOLOGICAL NEWS: "A Setting-block for Lepidoptera" (1898), "The Art of Collecting Catocala" (1899), "A Convention of Entomologists at the home of Dr. Wm. Barnes" (1910), "The St. Louis Entomological Club" (1911), "Miss Mary Murtfeldt" (1913), and jointly with Henry McElhose

"List of 110 Species and Varieties of Butterflies taken by Members of the St. Louis Entomological Club in the Vicinity of St. Louis, Mo." (1907). He had a collection of butterflies taken in Missouri.—EDWIN P. MEINERS.

Dr. GEORGE W. BOCK died in St. Louis, Missouri, July 22, 1940. He was at one time a very enthusiastic beetle collector and carried on a rather extensive correspondence with many of the older collectors. He built up a collection said to number about 45,000 specimens. Born in Hamelin, Germany, June 23, 1856, he came to the United States when he was 24 years of age. Eventually he settled to the practice of medicine in St. Louis, in which he continued until a few years ago, being compelled to retire due to the infirmities of age. Dr. Bock collected principally in the vicinity of St. Louis, but in his early years made two rather extensive collecting trips, one to Guatemala and another to Mexico. He was one of the organizers of the St. Louis Naturalists Club and at one time a member of the St. Louis Entomological Club. He contributed an article to the December, 1907, number of ENTOMOLOGICAL NEWS on "An absolutely sure method of preservation of Natural Scientific collections against insect enemies".—EDWIN P. MEINERS.

AUGUST KNETZGER died at his home in Alton, Illinois, on July 2, 1940, at the age of 73 years. Mr. Knetzger, who was a musician by profession, was at one time an ardent student of the Lepidoptera and contributed the following articles to ENTOMOLOGICAL NEWS between the years 1907 and 1912: "St. Louis Butterflies", "Migration of Anosia plexippus", "Notes on Missouri Lepidoptera", and "Observations on the Lepidoptera of St. Louis, Mo. and vicinity during 1911". He was at one time a member of the Heink Entomological Club and the St. Louis Entomological Club. He recently gave his collection of 8,000 butterflies to the Pere Marquette State Park at Grafton, Illinois.—EDWIN P. MEINERS.

CHARLES L. HEINK died at his home in St. Louis, Missouri, on June 8, 1940. Although not a scientist in the strict sense of the word, Mr. Heink did much to interest others in the

study of insects. He was particularly concerned with the Lepidoptera, of which he formed a considerable collection. He was much interested in the early stages and reared many of his specimens from the egg and larvae. All of his collecting was done in the region around St. Louis, his collection being built up through the exchange of his duplicates.

EDWIN P. MEINERS.

A memorandum on the back of Mr. Heink's photographic portrait, in the collection of the American Entomological Society, states that he was born February 9, 1869, at Stonyhill, Gasconade County, Missouri, and organized the Heink Entomological Club, December 15, 1907.—E. T. CRESSON, Jr.

Mrs. VITAE KITE died at Hollister, Taney County, Missouri, February 14, 1940. "A Calendar of Ozark Butterflies" appeared from her pen in ENTOMOLOGICAL NEWS for February, 1934. Starting late in life to form a collection of butterflies, she built up a collection of about 10,000 specimens, mostly locals and exotics. This collection has been given to The School of the Ozarks at Point Lookout, Missouri.—EDWIN P. MEINERS.

DR. CLARENCE PRESTON GILLETTE, director emeritus of the Colorado Agricultural Experiment Station and emeritus professor of entomology and zoology at Colorado State College of Agriculture and Mechanical Arts, died at his home in Fort Collins, Colorado, on January 4, 1941. Born in Ionia County, Michigan, April 7, 1859, he attended the Michigan public schools, then Michigan State College, where he received the B.S. in 1884, the M.S. in 1887 and the honorary Sc.D. in 1918. He was assistant in zoology, Michigan State College, until 1888, when he became entomologist of the Iowa State College Experiment Station at Ames, Iowa, and in 1891, head of a new department of zoology, entomology and physiology at Colorado State College. In 1907, he became Colorado's first state entomologist, and in 1910, also director of the Colorado Experiment Station, until his retirement in 1932. His papers include lists of the Orthoptera and Hemiptera of Colorado, many articles dealing with Cynipidae, Cicadellidae and Aphidae, and his last important work, the Aphidae of Colorado, published jointly with Miss Miriam A. Palmer. (From obituary by DR. GEO. M. LIST in *Science* for February 28, 1941.)

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# On A New Subgenus of Pemphilidine Wasps From Cuba (Hymenoptera: Sphecidae)

By V. S. L. Pate, Cornell University, Ithaca, New York.

The Pemphilidine wasps are divisible into a dozen or more discrete generic entities, despite the asseverations of various competent authorities to the contrary. Some of these, such as *Dasyproctus,* are confined entirely to the Old World, while others like *Anacrabro* and *Entomocrabro* are restricted wholly to the western hemisphere. The great majority of the species, however, are referable to four large cosmopolitan genera: *Ectemnius, Crossocerus, Lestica* (olim *Solenius* seu *Ceratocolus*), and *Pemphilis* (olim *Crabro* F. nec Geof.), each of which comprises a number of distinct phyletic strains sufficiently discrete from one another by congeries of morphological, ethological, and biogeographical characteristics that they may be accorded subgeneric rank. The genus *Ectemnius* (olim *Crabro* Auctt., nec. F., nec Geof.) is separable at present into a number of such subgenera. To these may now be added the following striking and remarkable Antillean entity described herewith.

## MEROSPIS[1] new subgenus.

The broadly expanded, thin and laminate, shield-like fore femora, the flattened fore tarsi, and the absence of an apical calcar on the middle tibiae of the males, distinguish *Merospis* from all the other subgenera of *Ectemnius.* The nearest affinities of the present distinctive entity appear to lie with the Old World subgenus *Metacrabro,* with which it agrees very closely in the venation of the fore wing and the slender elongate hind wing with the anal lobe vestigial. But in addition to the characters given above, *Merospis* differs from that complex in the finely punctate mesonotum, the strong inner basal mandibular

[1] *Merós* thigh + *aspís,* shield; in allusion to the expanded fore femora of the males.

tooth, and the sulcate ultimate abdominal tergite and emarginate antennal flagellum of the male.

*Diagnostic Features.*—Small forms. Head subquadrate in anterior aspect, transversely subrectangular to subquadrate in dorsal aspect. Eyes naked, much more coarsely facetted anteriorly than posteriorly; inner orbits very strongly convergent toward clypeus and antennal sockets. Malar space obsolete. Vertex flat; supraorbital foveae absent; ocelli normal, arranged in a low triangle. Temples wide above, tapering ventrad; postorbital and temporal carinae wanting. Front vertical, narrow, strongly concave between the inner orbits but the basin not margined dorsally by a transverse carinule. Antennae situated low on face on dorsal margin of clypeus, twelve-segmented in both sexes, the antennal sockets contiguous to each other and also to the nearest lower inner orbit; flagellum not dilated but emarginate in males. Maxillary palpi six-segmented, labial palpi four-segmented. Mandibles bifid apically, lower margin entire, inner margin armed at base with a very large, elongate, inwardly directed, acuminate tooth.

Thorax with pronotum narrow, transverse, crested anteriorly, humeral angles dentate. Mesonotum finely punctate; suture between mesonotum and scutellum simple. Prepectus anteriorly with a sharp epicnemium which is continued onto anterior face of mesopleura, mesopleura with a sharp vertical carina before middle coxae, impunctate but with coarse subparallel, subhorizontal costulae which are continuous onto the metapleura and the lateral and posterior faces of propodeum; dorsal face of propodeum with coarse, subparallel, longitudinal costulae.

Fore legs with opposing faces of coxae flat, closely appressed to one another and furnished anteriorly with a sharp longitudinal carina, the distal posterior margin projecting backward and downward in a thin, translucent, semicircular laminate plate. Fore trochanters flattened and somewhat expanded. Fore femora thin, flat, and dilated into an irregular trigonal shield, but without spines or teeth beneath. Fore tibiae strongly compressed and flattened, elongate trigonal in shape. Fore tarsi strongly flattened, the metatarsi as long as the four distal segments combined. Middle and hind legs normal; the metatarsi slender, elongate, longer than the four distal articles combined; middle tibiae of males without an apical calcar, hind tibiae with two. Fore wing with marginal cell broadly and somewhat obliquely truncate apically; transverse cubital vein straight, oblique, inclivous, received on radius at or a little before middle of marginal cell; recurrent vein joining the submarginal cell

very close to apex of latter, the second abscissa of cubitus much shorter than the length of transverse cubital vein. Hind wings slender, elongate, costa absent; anal lobe very small, vestigial, not clearly delimited.

Abdomen sessile; finely, inconspicuously punctate; ultimate tergite of male without a pygidium, but with a median longitudinal furrow on apical two-thirds.

*Genotype*: *Ectemnius* (*Merospis*) *cyanauges* new species.

This interesting group is known at present from only the genotypic species.

**Ectemnius (Merospis) cyanauges**[2] new species.

The brilliant, metallic blue color, ivory maculations, and the distinctive shape of the fore legs will immediately distinguish the present species from all of its New World congeners.

*Type.*—♂; San Vincente, Pinar del Rio Province, CUBA. July 26-August 5, 1939. (C. T. Parsons.) [Museum of Comparative Zoölogy.]

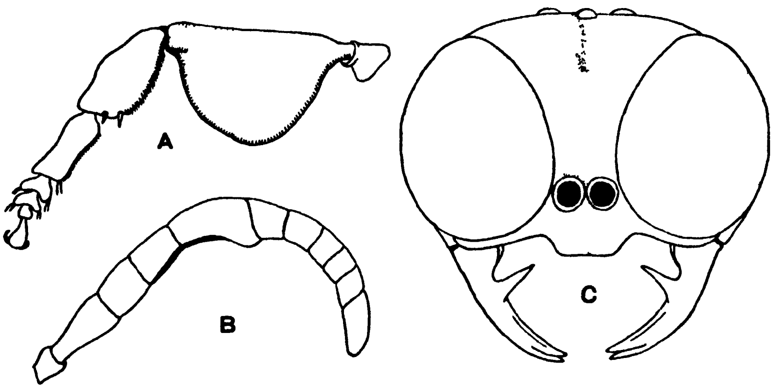


Fig. 1. *Ectemnius* (*Merospis*) *cyanauges* new species. Male (*type*. San Vincente, Pinar de Rio, Cuba): A, fore leg, B, pedicel and antennal flagellum; C, anterior aspect of head

♂.—7 mm. long. Bright cyaneous; the following eburneous: scape anteriorly, mandibles on outer basal two-thirds, pronotum and tubercles above, postscutellum, all tibiae on outer faces, fore femora with a small spot at knee, middle femora beneath, fore metatarsi, abdomen with narrow elongate transverse spots later-

[2] *Kuanaugés,* of a bright blue color.

ally on first six tergites, those of second and fourth segments much longer and wider than the others. Black: scape behind, pedicel, flagellum, mandibles apically and on inner and lower margins. Tegulae, axillary sclerites, and middle and hind tarsi, dark brunneous. Fore trochanters, and fore femoral shield with fore and hind margins and a narrow discal streak, castaneous. Wings hyaline, infumated anteriorly particularly in marginal and submarginal cells; veins dark brunneous.

Head fulgid; clypeus with lower inner and posterior orbits densely clothed with shining, appressed silvery pubescence; vertex, occiput and temples with rather long, suberect, inconspicuous, dark grey pubescence. Front with scapal basin strongly concave, nitidous, glabrous, not margined dorsally by a transverse carinule. Vertex, occiput, and temples with fine, separated, setigerous acupuncturation; vertex bisected anteriorly by a strong furrow running forward from median ocellus into scapal basin of front; no trace of supraorbital foveae; ocelli situated in a very low triangle, the postocellar line six-tenths the length of ocellocular distance; temples without orbital or temporal carinae; occipital carina distinct, forming a complete circle which is tangent below to the hypostomal carinule. Antennae short, reaching about to occiput; scape cylindrical, four-sevenths the vertical length of eye; pedicel subcylindrical, short, one-half the length of first flagellar article; flagellum with first four articles elongate, the first one-and-one-half the length of second which is subequal in length to third, the fourth one-and-one-sixth the length of first, remaining segments, except last, but one-half the length of first, ultimate article simple, terete, subequal in length to two preceding segments combined, the third segment slightly, the fourth strongly emarginate beneath. Clypeus narrow, linear, flat laterally to weakly tectate discally, median length two-sevenths vertical length of eye, produced medio-apically into a short broad truncate lobe the apical width of which is subequal to median length.

Thorax fulgid; generally clothed with rather long, suberect, light pubescence. Pronotum narrow, transverse, situated on a level with mesonotum, anterior dorsal margin sharply transversely carinate for entire width save for a deep median notch, the lateral angles acutely dentate, posterior margin narrowly but deeply impressed. Mesonotum with well separated, distinct, setigerous acupuncturation throughout, anteriorly with a few transverse, curved, weak and indistinct striae, anterior half with three parallel well separated carinules; suture between mesonotûm and scutellum simple, not foveolate; scutellum per-

fulgid, very sparsely acupunctate, flatly tumid, posterior margin abruptly and deeply impressed and foveolate; axillae not margined laterally; postscutellum transverse, linear, short, one-half length of scutellum, perfulgid, subnitidous, almost impunctate. Mesopleura impunctate but with fine and coarse subhorizontal and subparallel costulae more or less continuous onto metapleura and lateral and posterior faces of propodeum, episternal suture inconspicuously foveolate, descending from below tegula and curving forward onto anterior face of mesothora, mesopleural pit almost obliterated by striation, episternauli, hypersternauli, and sternauli not evident, posterior margin inconspicuously foveolate; prepectus anteriorly with a sharp epicnemium, the carina forking dorsally into carinules which parallel the lower and posterior margins of pronotal tubercles. Propodeum perfulgid; clothed with pubescence like thorax; entire dorsal face with an undemarcated transverse subrectangular area traversed by subparallel longitudinal costulae; posterior face bisected by a deep, narrow, nitidous sulcus, and crossed by horizontal parallel rugulae which are continuous from lateral faces; lateral carinae wanting.

Legs with tibiae unarmed with spines on outer faces; otherwise as in subgeneric diagnosis.

Abdomen sessile, perfulgid; tergites with sparse, well separated, very fine acupuncturation, the ultimate tergite somewhat more distinctly and closely punctate than preceding tergite and with a median longitudinal furrow; penult tergite with an inconspicuous, transverse median constriction, last tergite with a stronger more perceptible one. Venter with first three sternites flatly convex, perfulgid, subnitidous, glabrous, with microscopically fine cancellate sculpture; fourth, fifth and sixth sternites flatly concave, subopaque, with close fine acupuncturation; seventh and eighth sternites flat, densely pilose, seventh with a deep, roundly V-shaped emargination posteriorly, eighth with caudal margin shallowly, broadly, circularly emarginate.

♀.—Unknown.

This species is known only from the unique male described above.

## The Malaria-carrying Anopheles gambiae.

Discussing the Malaria situation created by this mosquito in Brazil, President Fosdick in his Rockefeller Foundation Review for 1940 says: "No evidence of gambiae in Brazil was found during the last 47 days of 1940."

# Additions to the List of Nevada Dragonflies (Odonata).

By IRA LA RIVERS, Reno, Nevada.

Since the publication of my "Preliminary Synopsis of the Dragonflies of Nevada" (1940), several less common and more localized species have been found along two portions of the State's boundary. As the author had previously suspected, there are a number of West Coast dragonflies, hitherto accredited only to the region west of the Sierra Nevada Mountains, to be found crossing the Nevada-California line at those points where spurs or isolated peaks of the Sierra Nevada system lie in Nevada. The two regions so-far most productive of new dragonfly records along this border are Lake Tahoe and Boundary Peak.

The lake, whose surface waters lie at an approximate elevation of 6,225 feet, is surrounded by a ring of high Sierra peaks which vary from 7,000 to nearly 9,000 feet in height, the taller summits lying on the California side and forming the crest of the range. However, the ecologic environments do not differ considerably, on the average, from one side of the lake to the other, and the characteristic odonate species of this montane lake occur indifferently on either side. The summit of the Sierras strikes tangent from the north-northwest towards the lake, and approaches the Nevada line most closely near the south end of the lake. The entire eastern shoreline, and nearly half of the northern, lies in Nevada, so that it was to be expected when the author's first list was prepared that a number of California species not yet accredited to Nevada, but occurring in the adjacent Sierra Nevadas, might well be found at Lake Tahoe. A favorable spring and summer's collecting season here has verified these conclusions.

Boundary Peak, the tallest point in Nevada, rises to a height of 13,145 feet, and lies exactly 117 miles southeast along the Nevada-California boundary from the southern tip of Lake Tahoe. .It is the most northern summit of the lofty White Mountain Range which parallels the upper portion of the

southern Sierras, and may properly be considered a part of that extensive system, although separated from the Sierras themselves by the long and prominent Owens Valley. Here in the vicinity of Boundary Peak, which lies just inside the Nevada line, the author has taken several species of dragonflies which Ahrens recorded in 1938 from nearby Yosemite, which lies but a scant 45 miles (in a straight line) from the peak.

New species have also turned up along the ever bountiful Rio Colorado, which forms Nevada's extreme southeastern border. This stream has been the gateway used by several subtropical species in their expansion northward into the Great Basin, and it is not unlikely that other southern forms will be found here in the future.

In the following list, most of those species already recorded for the State in the author's "Synopsis"; have been given a more extended range within it as a result of the last season's collecting. An asterisk (*) denotes species accredited to the area by other writers, but overlooked in the "Synopsis", a double asterisk (**) those species which have been taken, to the author's knowledge, in the State for the first time.

Subfamily GOMPHINAE.

OPHIOGOMPHUS MORRISONI Selys—Ormsby and Washoe Counties (Marlette Lake).

**O. BISON Selys—Esmeralda County (Fish Lake Valley).

HERPETOGOMPHUS COMPOSITUS Hagen—Churchill County (Fallon, Humboldt Sink); Pershing County (Rye Patch Reservoir); Washoe County (Wadsworth).

GOMPHUS INTRICATUS Hagen—Churchill and Pershing Counties (Humboldt Sink).

G. OLIVACEUS Selys — Churchill and Pershing Counties (Humboldt Sink).

**OCTOGOMPHUS SPECULARIS (Hagen)—Esmeralda County (Boundary Peak).

Subfamily AESHNINAE.

ANAX JUNIUS (Drury)—Churchill County (Carson Lake, Carson Sink, Fallon, Lahontan Reservoir); Douglas County

(Gardnerville, Topaz Lake); Lyon County (Lahontan Reservoir, Sweetwater); Nye County (Beatty, Springdale).

**A. WALSINGHAMI MacLachlan—Clark County (Boulder Lake).

AESHNA CALIFORNICA (Calvert)—Lyon County (Sweetwater).

AE. MULTICOLOR Hagen—Churchill County (Carson Lake, Carson Sink, Fallon, Lahontan Reservoir); Esmeralda County (Fish Lake Valley); Nye County (Beatty, Springdale).

AE. UMBROSA Walker—Humboldt County (generally throughout the Santa Rosa Mountains).

**AE. WALKERI Kennedy—Esmeralda County (Boundary Peak).

AE. PALMATA Hagen—Washoe County (Truckee Meadows, Washoe Lake).

AE. CONSTRICTA Say—Churchill County (Humboldt Sink); Lyon County (Fernley); Pershing County (Lovelock); Washoe County (Washoe Lake).

AE. INTERRUPTA Walker—Humboldt County (National, Paradise).

**AE. VERTICALIS Hagen—Esmeralda County (Boundary Peak).

### Subfamily CORDULEGASTERINAE.

CORDULEGASTER DORSALIS Hagen—Washoe County (Cody Basin. A single straggler from the High Sierras, first recorded in the author's "Synopsis." The other "Synopsis" records of this species belong to *C. erroneus*). Previous records: none.

*C. ERRONEUS Hagen—Lyon County (Sweetwater); Washoe County (Franktown, Peavine, Verdi). Previous records: Hagen-Selys, 1878; Fraser, 1929; La Rivers, 1940.

### Subfamily MACROMIINAE.

MACROMIA PACIFICA Hagen—Lyon County (Sweetwater); Washoe County (Franktown).

M. MAGNIFICA MacLachlan—Nye County (Beatty).

Subfamily CORDULIINAE.

**SOMATOCHLORA SEMICIRCULARIS (Selys) — Esmeralda County (Boundary Peak).

**CORDULIA SHURTLEFFI Scudder — Esmeralda County (Boundary Peak).

Subfamily LIBELLULINÆ.

LIBELLULA SATURATA Uhler—Churchill County (Carson Lake, Carson Sink, Fallon, Humboldt Sink, Lahontan Reservoir); Esmeralda County (Fish Lake Valley); Lyon County (Lahontan Reservoir); Nye County (Beatty, Springdale).

**L. COMANCHE Calvert—Esmeralda County (Fish Lake Valley); Nye County (Beatty).

*L. PULCHELLA Drury—Douglas County (Gardnerville); Lyon County (Sweetwater); Washoe County (Truckee Meadows).

L. FORENSIS Hagen—Churchill County (Fallon, Lahontan Reservoir); Douglas County (Gardnerville, Genoa, Topaz Lake); Esmeralda County (Fish Lake Valley); Lyon County (Lahontan Reservoir, Smith Valley, Sweetwater, Yerington); Mineral County (Schurz); Nye County (Beatty, Springdale).

L. QUADRIMACULATA Linné—Douglas County (Gardnerville, Lake Tahoe); Ormsby County (Lake Tahoe, Marlette Lake); Washoe County (Lake Tahoe, Marlette Lake, Truckee Meadows).

L. NODISTICTA Hagen — Washoe County (Truckee Meadows).

L. COMPOSITA Hagen — Churchill County (Carson Sink, Fallon, Humboldt Sink).

**PLATHEMIS LYDIA (Drury)—Esmeralda County (Fish Lake Valley); Lincoln County (Pahranagat Valley); Lyon County (Sweetwater); Nye County (Beatty); Washoe County (Truckee Meadows, Wadsworth). Previous records: La Rivers, 1938.

P. SUBORNATA Hagen—Churchill County (Fallon, Lahontan Reservoir); Washoe County (Truckee Meadows).

SYMPETRUM CORRUPTUM (Hagen)—Churchill County (Carson Lake, Fallon, Humboldt Sink, Lahontan Reservoir); Doug-

las County (Genoa, Glenbrook, Minden); Humboldt County (generally throughout the Santa Rosa Mountains); Lyon County (Lahontan Reservoir, Sweetwater); Mineral County (Hawthorne); Ormsby County (Lake Tahoe, Marlette Lake); Washoe County (Franktown, Lake Tahoe, Marlette Lake).

S. ILLOTUM (Hagen)—Douglas County (Gardnerville); Lyon County (Sweetwater); Ormsby County (Carson City); Washoe County (Washoe Lake).

S. MADIDUM (Hagen)—Humboldt County (National).

S. PALLIPES (Hagen)—Churchill County (Fallon, Humboldt Sink); Humboldt County (Paradise Valley).

*S. OBTRUSUM (Hagen)—Elko and White Pine Counties (Ruby Valley). Previous records: Ahrens, 1938 (as S. decisum Hagen).

S. RUBICUNDULUM (Say)—Churchill County (Carson Sink, Fallon, Lahontan Reservoir); Washoe County (Wadsworth).

S. SEMICINCTUM (Say)—Churchill County (Carson Lake, Fallon, Humboldt Sink, Lahontan Reservoir); Humboldt County (Paradise Valley).

S. COSTIFERUM (Hagen)—Churchill County (Fallon).

S. DANAE (Sulzer)—Churchill County (Fallon).

S. ATRIPES (Hagen)—Douglas County (Gardnerville).

**LEUCORRHINIA HUDSONICA (Selys)—Esmeralda County (Boundary Peak).

L. GLACIALIS Hagen—Esmeralda County (Boundary Peak).

PACHYDIPLAX LONGIPENNIS (Burmeister) — Churchill County (Fallon, Lahontan Reservoir); Douglas County (Gardnerville, Topaz Lake); Washoe County (Verdi).

ERYTHEMIS SIMPLICICOLLIS (Say)—Churchill County (Fallon, Lahontan Reservoir); Douglas County (Gardnerville, Genoa); Lyon County (Lahontan Reservoir, Smith Valley, Sweetwater, Wabuska, Yerington); Washoe County (Verdi).

PANTALA HYMENEA (Say)—Esmeralda County (Fish Lake Valley); Nye County (Beatty, Springdale).

P. FLAVESCENS (Fabricius)—Douglas County (Gardnerville); Washoe County (Truckee Meadows, Washoe Valley).

TRAPEZOSTIGMA LACERATA Hagen—Nye County (Beatty).

T. ONUSTA Hagen—Washoe County (Lawton Valley).

(To be continued.)

# A New Species of Coniontis from Nevada (Coleoptera: Tenebrionidae).

By Frank E. Blaisdell, Sr., Stanford Medical School and Associate in Research, California Academy of Sciences, San Francisco, California.

**Coniontis lariversi** new species.

Form oblong-oval to somewhat cuneate, nearly twice as wide, a little more than twice as long as the pronotum. Color deep black; luster dull and alutaceous. Pubescence absent from the superior surface; short, pale hairs are present beneath. Ventral surface more or less polished.

Head relatively small, widest across the posterior canthi and eyes, twice as wide as long before the post-ocular line; sides less prominent than eyes, margin arcuate over the antennal insertions, thence straighter and convergent to the rounded epistomal angles, not sinuate at position of the obliterated oblique sutures. Epistomal apex rather broadly, not deeply, arcuately emarginate. Frons not convex and without impressions, sides slightly convex and briefly declivous against the eyes; surface densely punctate, punctures moderately small and irregular, intervals densely and very minutely punctulate. Labrum transverse, about twice as wide as long; sides arcuate and continuously so with the apex, angles absent; apex rather deeply and arcuately emarginate at middle. Antennae slender, moderate in length, about attaining the posterior third of the pronotum; last four segments moderately compressed; segments two to seven inclusive obconical and more or less elongate; the second about one-half as long as the third; the latter two-and-one-half times as long as wide at apex; segments four, six, seven and eight subequal in length, and less than twice as long as wide at apex; eight obconico-subtriangular, ninth and tenth triangular and as long as wide; eleventh, slightly smaller and widest at middle, apex subacute.

Pronotum about one-third wider than long, widest in basal half; apex broadly emarginate between the bluntly rounded angles in moderate circular arc, marginal bead very narrow and inconspicuous; sides arcuately convergent anteriorly, less so behind the middle and parallel; base subtransverse, very broadly and feebly arcuate in middle two-fourths, thence broadly slightly sinuate to the moderately, posteriorly prominent angles. Disk evenly convex from side to side and rather antero-laterally declivous, sparsely and irregularly punctate, punctures smaller than

on the head, the intervals indistinctly punctulate; lateral margins distinctly and moderately strongly beaded; submarginal grooves very narrow and rather deep; base not beaded.

Elytra oblong, a little more than twice as long as wide and two-and-two-sixths times as long as the pronotum at middle; base truncate, scutellum triangular and impunctate; humeri narrowly rounded and not prominent beneath the pronotal basal angles; sides straight, parallel or somewhat convergent to apical third, thence arcuately convergent to the subacute apex. Disk rather evenly arcuate from side to side, moderately and arcuately declivous apically; punctures small and inconspicuous, irregular, intervals with a number of fine, irregular feebly impressed lines; apical declivity slightly rugose. Marginal bead narrow and scarcely visible from above, except at humeri and apically.

Prosternum rather densely punctate, punctures moderately small becoming somewhat coarser on the intercoxal process, which is feebly and rather indistinctly margined laterally between the coxae, apex not margined. Propleurae smooth, coxal convexities finely and longitudinally rugose. Sterna very finely and sparsely punctate.

Abdomen polished and shining, sparsely punctulate and more or less irregularly but not strongly rugose.

Middle and posterior legs rather long, femora rather narrow and parallel; the metafemora two-fifths of their length longer than the mesofemora; tarsi long and slender.

Measurements.—(Types) Length 17-17.5 mm.; width 7-8 mm.

*Holotype,* female, No. 5077, and *allotype,* male, No. 5078, Museum of the California Academy of Sciences. Collected in the vicinity of Reno, NEVADA, by Ira La Rivers, to whom the species is dedicated. Paratypes in the Academy of Natural Sciences of Philadelphia. The author in 1902, collected a few specimens along the railroad toward Truckee from Verdi, Nevada.

♂ ♂.—Form narrower, often more or less cuneate. Prosternal intercoxal process slightly wider and feebly more convex, with the punctures a little coarser than in the opposite sex.

♀ ♀.—Form oblong-oval and broader. Prosternal process more finely punctate and the surface quite flat.

*Lariversi* does not belong to the Opaca Group of Casey, which contain some of the smallest species of the genus, and the size

does not as far as known exceed 10 mm. One of the species, *nevadensis* Casey occurs at Reno, Nevada and was named from a single specimen. In the *abdominalis, strenua, robusta* Group of Casey,the body is large in size and much broader; the prosternal process is more apt to be margined throughout. Twenty-two specimens studied.

## Addenda to the Odonata of Maryland.

By Herbert H. Moorefield,
The Natural History Society of Maryland, Baltimore.

Since the appearance of the recent "List of Maryland Odonata", by Elizabeth G. Fisher,* the writer has compiled a few further notes of interest on the Anisoptera of this State. The specimens listed below are deposited in the collection of the Department of Entomology, Natural History Society of Maryland, and were collected by the writer unless otherwise noted.

The majority of the important collecting stations were described in Fisher's report, and the only one of additional interest is Twin Lakes. These are two small, natural lakes near Lansdowne, Baltimore County.

Family Aeshnidae.

Aeshninae.

1. Gomphaeschna antilope (Hagen). Druid Hill Park, Baltimore City, June 5, 2 ♀, (D. N. Bachrach). A male of this species was taken on the eleventh floor of a downtown office building of Baltimore City on the same date.

Cordulegasterinae.

2. Cordulegaster obliquus (Say), Bengies, Harford Co., June 12, 1 ♀, (D. N. Bachrach). Cross Country Blvd., Baltimore City, July 5, 1 ♂. This species was depositing eggs in a fresh water stream on June 12, at Bengies, Md.

Family Libellulidae.

Corduliinae.

3. Somatochlora filosa (Hagen). Tolchester, Kent Co., August 16, 1 ♀.

* Ent News, 1940, Vol. LI, No. 2, pp. 37-42; Vol. LI, No. 3, pp. 67-72.

4. CORDULIA SHURTLEFFI Scudder. Mountain Lake Park, Garrett Co., June 26, 1 ♂, (H. C. Seibert).

Libellulinae.

5. CELITHEMIS MONOMELAENA Williamson. Twin Lakes, Baltimore Co., June 13, 1 ♂, 1 ♀; July 8, 1 ♀.

6. LADONA EXUSTA (Say). Lake Shore, Anne Arundel Co., May 28, 1 ♂.

7. L. JULIA (Uhler). Lake Shore, Anne Arundel Co., May 28, 2 ♂; June 2, 2 ♂. Twin Lakes, Baltimore Co., June 26, 1 ♀.

8. LIBELLULA AXILLENA Westwood. Twin Lakes, Baltimore Co., June 13, 1 ♀. Laurel, Prince George Co., July, 1 ♂.

9. LEUCORRHINIA INTACTA (Hagen). Hillendale, Baltimore Co., July 6, 1 ♀, (H. C. Seibert).

10. TRAPEZOSTIGMA CAROLINA (Linnaeus). Lake Shore, Anne Arundel Co., May 28, 1 ♂; June 2, 2 ♂; August 6, 2 ♂. Twin Lakes, Baltimore Co., June 13, 1 ♂, Tolchester, Kent Co., August 16, 1 ♂. This species was observed mating at Lake Shore, on June 2.

## A New Species of Trox from Texas (Coleoptera: Scarabaeidae).

By MARK ROBINSON, Sharon Hill, Pennsylvania.

**Trox (Omorgus) fuliginosus** new species.

This interesting species is closely related to the well known *T. monachus* Herbst, but can readily be distinguished by the color differences and dissimilarity of the male genitalia. The elytra tubercules are usually a little higher and the wings a trifle longer in *monachus*.

Oblong; iron-gray opaque coating over entire body except head, thoracic and elytral tubercules, elytral umbones, tibiae and tarsi which have an ochraceous-yellow opaque coating. The opaque coating under a high magnification might be called granule-pollinose.

Clypeus triangular; vertex of head with two tubercules side by side, in front of each of which near the clypeal margin is

a deep pit. Entire anterior and side margin of head strongly reflexed and fimbriate with ochraceous-orange hairs.

Thoracic ridges and tubercules as usual in this subgenus; side margins evenly rounded except near the hind angles where they are deeply incised, hind margin indicated with a raised line especially laterally. Dorsal surface of ridges and tubercles moderately not densely punctured, each puncture bearing a short ochraceous-orange scale like hair.

Elytral tubercules low, oval; arranged in four primary rows in addition to the sutural row; between each of these rows is a vague line of minute tubercles and between the rows of smaller and larger tubercles is a line of shallow punctures. Humeral and apical umbone prominent.

Scape of antenna black; bristling with rather long ochraceous-orange hairs; funicle reddish, glabrous; club ochraceous-yellow. Apical process of anterior tibiae unifid, side margin of tibiae without trace of denticles, plane. Abdominal plates with a few scattered punctures.

The male genitalia of the present species are generally wider and blunter than *monachus;* the inner margins of the claspers are expanded posteriorly until they form nearly parallel lines for one-fifth the length of the genitalia; in *monachus* this section of the genitalia forms an ovate figure. Viewed laterally, the tips of the claspers are longer and bent downward a trifle more than they are in *monachus.*

Wings: Length, 16.9 mm.; Breadth, 6.0 mm.

Length, 14.2 to 15.1 mm.; Breadth, 7.8 to 8.5 mm.

*Type.*— ♂, New Braunfels, Comal County, TEXAS, April 10, 1902 (H. Mittendorf). [In the collection of the United States National Museum].

*Allotype.*— ♀, With same data as type. [In collection of the United States National Museum].

*Paratypes.*—1 ♂, With same data as type. 1 ♀, Harris County, TEXAS, May 1909 (C. R. Oerto). [Both specimens are in the collection of the author].

# Western Aphid Notes[1] (Homoptera: Aphididae).

By GEORGE F. KNOWLTON[2].

The following report adds to the known distribution of a number of aphids and includes the description of one apparently undescribed species of the genus *Aphis*.

BREVICORYNE SYMPHORICARPI (Thos.). Gallatin Valley, Montana, July 16, 1936 (Knowlton).

CAVARIELLA CAPREAE (Fab.). On *Salix,* Weber Canyon, Utah; on Umbelliferae at Puyallup, Washington, July 28, 1937 (H. C. Bennion).

C. ESSIGI (Gill.). On *Heracleum lanatum* at Spring Hollow, Logan Canyon, Utah, June 19, 1938 (Knowlton-W. P. Nye).

APHIS HERACLELLA Davis. On *Cicuta occidentalis* at Lewiston, Utah, July 13, 1923 (Knowlton).

**Aphis tetradymia** n. sp.

*Apterous vivipara.* Color bluish green; size, 1.3 mm. long and 0.75 mm. wide; antennae 0.81 mm. long, dusky to black; antennal III, 0.18 to 0.2 mm. long, with 0 to 4 sensoria on distal half; IV, 0.09 to 0.1 with 0 to 1 sensorium; V, 0.09 to 0.1; VI, 0.09+0.16 to 0.2 mm. long; rostrum reaching abdomen; rostral IV+V rather thick, 0.13 mm. long; hind tibiae 0.6 to 0.71 mm.; hind tarsi 0.1; cornicles blackish, imbricated, 0.11 to 0.13 mm. long, slightly wider toward base; cauda blackish with 4 to 5 hairs on each side and 3 on dorsal to dorsolateral surfaces.

*Aphis tetradymia* resembles *A. cryptus* P.-K., but differs in having shorter, thicker rostral IV+V, more slender body, and in possessing fewer conspicuous abdominal tubercles. It differs from *A. maidi-radicis* Forbes in being smaller in size, having longer antennae, fewer hairs on cauda, usually possessing sensoria on antennal III and IV of aptera, and having a darker bluish-green body color.

Described from wingless specimens collected upon *Tetradymia canescens* at Fisher's Pass, Tooele County, UTAH, August 16, 1932 (G. F. Knowlton). *Type* in the collection of the writer.

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[1] Contribution from the Entomology Department, Utah Agricultural Experiment Station, Logan.

[2] Research associate professor.

EPAMEIBAPHIS ATRICORNIS G.-P. On *Artemisia,* usually *tridentata,* in Utah at Beaver Dam, Circleville, Hansel's Mountains and Maple Canyon; in Idaho at Preston and Rexburg, 1935 (C. F. Smith); in Colorado at De Beque, 1935, Cross Mountains and Elk Springs, June 25, 1937 (Knowlton).

E. UTAHENSIS K.-S. On *Artemisia vulgaris* in Utah at Blacksmith Fork Canyon, June 10, 1930; on *A. tridentata* at Providence, August 26, 1925, Raft River Mountains, and Woodruff Mountains (Knowlton); Levan, Salt Lake City, and Vernon (Knowlton-C. F. Smith).

FLABELLOMICROSIPHUM KNOWLTONI Smith. On *Artemisia tridentata,* Bountiful and Roy, Utah, June 4, 1937 (Knowlton-Smith).

F. TRIDENTATAE (Wilson). On *Artemisia tridentata* at Beaver Dam, Hansel's Mountains, Junction Valley, Manti and Portage, in Utah; Palisade, August 24, 1925 and Sunbeam, June 25, 1937, in Colorado (Knowlton).

PSEUDOEPAMEIBAPHIS ESSIGI K.-S. On *Artemisia tridentata* at Kelton and Morgan, Utah (Knowlton).

P. GLAUCA G.-P. On *Artemisia tridentata* in Utah at Bountiful, Butlerville, Peterson, Roy and Strawberry Valley (Knowlton-Smith).

P. TRIDENTATAE (Wilson). On *Artemisia tridentata* at Palisade, Colorado, August 24, 1935 (Knowlton); at Burly, Idaho, July 9, 1931 (D. E. Fox).

P. XENOTRICHUS K.-S. On *Artemisia tridentata* in Brigham Canyon, Utah, August 29, 1936 (Knowlton).

RHOPALOSIPHUM GRABHAMI Ckll. On *Lonicera involucrata,* Eden and Logan, Utah, June 1937 (Knowlton-Smith-F. C. Harmston); Mt. Vernon, Washington, June 8, 1935 (A. J. Hanson).

R. MELLIFERUM (Hottes). In Idaho at Blue Gulch, Castleford, Hollister and Wendell (D. E. Fox).

R. RHOIS Mon. On *Rhus* at Granite, Utah, August 1935 (Knowlton).

R. RUFOMACULATA (Wilson). On *Chrysanthemum* at Logan, Utah, in greenhouse, January 10, 1934 (C. F. Smith).

R. SCIRPIFOLII G.-P. Blue Gulch, Idaho (D. E. Fox).

MINUTICORNIS GRAVIDUS Knlt. On *Juniperus* at Pocatello, Idaho, June 18, 1936 (Knowlton).

TOXOPTERA VIRIDI-RUBRA G.-P. Wendell, Idaho, 1930 (Fox).

AMPHOROPHORA CRATAEGI (Mon.). Hollister, Idaho, 1930 (Fox).

A. GERANII (G.-P.). Buhl, Idaho, October 17, 1930 (Fox).

A. GRINDELIAE (Will.). On *Grindelia squarrosa*, Logan, Utah, July 4, 1935; and Franklin, Idaho (Knowlton).

A. RUBI (Kalt.). On raspberry, Hamilton, Montana (W. Shockley).

BIPERSONA TORTICAUDA (Gill.). On *Cirsium* at Salt Lake City, Utah, June 15, 1937 (Knowlton); and Florence, Montana (H. F. Dietz).

CAPITOPHORUS BITRICHUS K.-S. On *Artemisia tridentata*, Hyrum, Utah, August 23, 1938 (Knowlton).

C. GILLETTEI Theob. On *Polygonum*, Enumclaw, Washington, August 18, 1937 (H. C. Bennion).

C. POTENTILLAE (Walk.). On *Rosa nutkana*, near Forks, Washington, August 27, 1936 (W. W. Baker).

C. OESTLUNDI Knlt. On *Chrysothamnus nauseosus* at Elko, Nevada, June 16, 1934 (Knowlton).

C. PYCNORHISUS K.-S. On *Chrysothamnus viscidiflorus* at Riverdale, Idaho, July 24, 1936 (C. F. Smith).

C. QUADRITRICHUS K.-S. On *Artemisia tridentata* at Sunbeam, Colorado, June 25, 1937 (Knowlton).

C. ZOOMONTANUS K.-S. On *Artemisia vulgaris* at Afton, Wyoming, July 19, 1936 (Knowlton).

MACROSIPHUM CREELI Davis. On alfalfa, Mathews, Ephrata, Washington (A. C. Burrill).

M. EUPHORBIAE (Th.). Castleford and Hollister, Idaho, August 1930 (D. E. Fox).

## Honor to an Entomologist.

*Science* for April 25, 1941, states that Hugh Scott, assistant keeper of entomology, British Museum (Natural History), has been elected a fellow of the Royal Society of London.

# Current Entomological Literature

**COMPILED BY V. S. L. PATE, L. S. MACKEY and J. W. CADBURY.**

Under the above head it is intended to note papers received at the Academy of Natural Sciences of Philadelphia pertaining to the Entomology of the Americas (North and South), including Arachnida and Myriopoda. Articles irrelevant to American entomology will not be noted; but contributions to anatomy, physiology and embryology of insects, however, whether relating to American or exotic species will be recorded

This list gives references of the current or preceding year unless otherwise noted. All continued papers, with few exceptions, are recorded only at their first installment.

For records of Economic Literature, see the Experiment Station Record, Office of Experiment Stations, Washington. Also Review of Applied Entomology, Series A, London. For records of papers on Medical Entomology, see Review of Applied Entomology, Series B.

**Note.** References to papers containing new forms or names not so stated in titles are followed by (*); if containing keys are followed by (k); papers pertaining exclusively to neotropical species, and not so indicated in the title, have the symbol (S) at the end of the title of the paper.

**The figures within brackets** [ ] refer to the journal in which the paper appeared, as numbered in the list of Periodicals and Serials published in our January and June issues This list may be secured from the publisher of **Entomological News** for 10c. The number of, or annual **volume**, and in some cases the part, heft, &c., the latter **within** ( ) follows; then the pagination follows the colon :

**Papers published in the Entomological News are not listed.**

**GENERAL.—Adamson, A. M.**—The geographical distribution of insect pests. [Trop. Agric.] 18: 43-47. **Anon.** How to make an insect collection. [Ward's Nat. Sci. Est., Inc.] 1940: 30 pp., ill. **Berezina, V. M.**—A fragment to the method of investigating the part played by the light in the life of insects. [Bull. Plant Prot. Lenin Ac. Ag. Sci.] No. 3: 37-38. **Blatchley, W. S.**—Obituary with portrait, by W. T. Davis. [19] 36: 18-19. **Blatchley, W. S.**—Obituary. By V. M. Tanner. [120] 2: 33-35. **Calvert, P. P.**—Catalogues of current scientific literature. [Science] 93: 209-210. **Gillette, Clarence Preston.**—Obituary, with portrait, by G. M. List. [12] 34: 129-130. **Herrick & Griswold.**—Common insects of the household. [Cornell Ext. Bull.] No. 202: 66 pp., ill. **Jones, T. H.**—Obituary notice. By Hyslop & Graf. [10] 43: 60-62, ill. **Knowlton & Harmston.**—Insect food of the Chipping Sparrow. [12] 34: 123-124. **Martorell, L. F.**—Some notes on forest entomology IV. [The Caribbean Forester] 2: 80-82. **Silvestri, F.**—Importancia de la Entomologia en la Economia Mundial. [An. Esc. Nac. Cien. Biol. Mex.] 1: 301-315. **Smith, H. S.**—Racial segregation in insect populations and its significance in applied entomology. [12] 34: 1-13. **Spencer, G. J.**—Lead or tin tubes in a biological laboratory. [4] 73: 54. **Swingle, Gahan & Phillips.**—Laboratory rearing of certain leaf-eating insects.

[12] 34: 90-95, ill. **Warren, B. C. S.**—A few comments on some inconsistent criticism. [9] 74: 51-53. **Woodworth, Chas. Wm.**—Obituary with portrait, by E. O. Essig. [12] 34: 128-129.

**ANATOMY, PHYSIOLOGY, ETC.—Abbott, C. E.**—Concerning the musculature of the male genitalia in Panorpa nuptialis (Mecoptera). [6] 49: 43-46, ill. **Bryson & Dillon.**—Observations on the morphology of the corn seed beetle, Agonoderus pallipes (Carabid.). [7] 34: 43-50, ill. **Cumpston, D. M.**—On the external morphology and biology of Heteronychus sanctae-helenae and Metanastes vulgivagus (Scarab.). [Pro. Linn. Soc. N. S. W.] 65: 289-300, ill. **Ermolaev, M. F.**—The biology of Thrips linarius and control measures against it. [Bull. Plant Prot. Lenin Ac. Ag. Sci.] No. 3: 23-34, ill. **Geigy & Zinkernagel.**—Beobachtungen beim Aufbau einer technischen Grosszucht der Kleidermotte (Tineola bisselliella). [41] 18: 213-232, ill. **Giral, F.**—Pigmentos fluorescentes de insectos y bacterias [Rev. Soc. Mexicana Hist. Nat.] 1: 243-254, ill. **Hagmann, L. E.**—A method for injecting insect tracheae permanently. [Stain Technology] 15: 115-118, ill. **Hanstrom, B.**—Die chromatophoraktivierende substanz des insektenkopfes. [Lunds Univ. Arsskrift] 36: 20 pp., ill. **Hawley & Dobbins.**—Mortality among hibernating larvae of the Japanese beetle with special reference to conditions in the winter of 1935-36. [6] 49: 47-56, ill. **Hitchcock & Haub.**—The interconversion of foodstuffs in the blowfly (Phormia regina) during metamorphosis. I.—Respiratory metabolism and nitrogen excretion. [7] 34: 17-25; 32-37, ill. III.—Chemical composition of larvae, pupae and adults. **Holdsworth, R. P.**—The histology of the wing pads of the early instars of Pteronarcys proteus (Plecoptera). [5] 47: 112-120, ill. **Kozhanchikov, I. V.**—The importance of the physical conditions of environment upon the development of the eggs of the gipsy moth (Lymantria dispar). [Bull. Plant Prot. Lenin Ac. Ag. Sci.] No. 3 (1940) 3-16, ill. Effect of ecological factors upon the variability of certain Lepidoptera during the period of their growth and development. [Trav. Inst. Zool. Acad. Sci. URSS] 6: 64-114, ill. **Kozhantschikov, J. W.**—Influence of ecological factors on development and variability of lepidoptera. [Bull. Acad. Sci. URRS] 1940, 761-782, ill. **Lotmar, R.**—Das Mitteldarmepithel der Raupe von Tineola biselliella (Kleidermotte), insbesondere

sein Verhalten wahrend der Hautungen. [41] 18: 233-248, ill. **Ludwig & Fox.**—Further studies of conditions influencing the survival of Japanese beetles through metamorphosis. [6] 49: 65-75. **Mickey, Carpenter, Cumley & Burdette.**—Experiments on culture media in regard to oviposition and mass production of Drosophila melanogaster. [6] 49: 77-84. **Nesbitt, H. H. J.**—A comparative morphological study of the nervous system of the Orthoptera and related orders. [7] 34: 51-81, ill. **Patton, Hitchcock & Haub.**—The interconversion of food-stuffs in the blowfly (Phormia regina) during metamorphosis. II.—Changes in composition as determined by the oxycalorimeter. [7] 34: 26-31, ill. **Putman, W. L.**—The feeding habit of certain leafhoppers (Homoptera: Cicadellidae) [4] 73: 39-53, ill. **Roth & Howland.**—Studies on the gaseous secretion of Tribolium confusum. I.—Abnormalities produced in Tribolium confusum by exposure to a secretion given off by the adults. [7] 34: 151-176, ill. **Shaw, F. R.**—Bee poisoning: a review of the more important literature. [12] 34: 16-21. **Strelnikov, I. D.**—The effect of solar radiation and hunger on the pulsation of the heart of the caterpillars of Phytometra gamma. [Trav. Inst. Zool. Acad. Sci. URSS] 6: 266-288, ill. **Sweetman, H. L.**—Tests for toxicity of arsenicals and sodium fluoride to the American roach, Periplaneta americana. [4] 73: 31-34. **Tshernova, O. A.**—Report on biology and morphology of Pleonomus tereticollis (Elateridae). [Trav. Inst. Zool. Acad. Sci. URSS] 6: 138-149, ill. **Weiss, Soraci & McCoy.**—Notes on the reactions of certain insects to different wave-lengths of light. [6] 49: 1-20, ill. **Wesson, L. G.**—See under Hymenoptera.

**ARACHNIDA AND MYRIOPODA.**—**Chamberlain & Mulaik.**—On a collection of Millipeds from Texas and New Mexico. [6] 49: 57-64 (*). **Chamberlin, R. V.**—New Polydesmoid Diplopods intercepted at quarantine [10] 43:32-35, ill. (S). **Lundblad, O.**—Weitere neue Wassermilben aus Brasilien und Paraguay. [28] 62: 122-126. **McGregor, E. A.**—A new spinning mite attacking strawberry on the mid-atlantic coast. [10] 43: 26-28, ill. **Michelbacher, A. E.**—Two genera of Symphyla new to the United States, with descriptions of three n. spp. [7] 34: 139-150, ill. **Parker, M. V.**—Preliminary list of spiders collected in the vicinity of Reelfoot Lake, Tennessee. [Jour. Tenn. Acad. Sci.] 16: 88-91. **Seyler, P. J.**—The generic and specific status of

four Ohio spiders of the gen. Agelenopsis. [43] 41: 51-69, ill.

**THE SMALLER ORDERS OF INSECTS.—Bick, G. H.**—Life-history of the dragonfly, Erythemis simplicicollis (Odonata: Libellul.). [7] 34: 215-230, ill. **Bolivar y Pieltain, C.**—Estudio de un nuevo Zoraptero de Mexico. [An. Esc. Nac. Cien. Biol. Mex.] 1: 515-522, ill. **Claassen, P. W.**—A catalogue of the Plecoptera of the World. [Cornell Univ. Ag. Exp. Sta.] Mem. 232: 235 pp. **Coleman, T. C.**—The Poduridae of southern California. [13] 33: 1-12, ill. **da Costa Lima, A.**—Nota sobre as especies de "Tunga (Tungidae). [Acta Medica] 5: 4 pp. **Crampton, G. C.**—The mating habits of the winter Mecopteron, Boreus brumalis. [5] 47: 125-128, ill. **Davis, C.**—Taxonomic notes on the order Embioptera. [Pro. Linn. Soc. N. S. W.] 65: 323-352; 362-387, ill. **Denning, D. G.**—Descriptions and notes on new and little known spp. of Trichoptera. [7] 34: 195-203, ill. **Fox, I.**—New or little known North American Japygidae (Thysanura). [4] 73: 28-31, ill. **Hood, J. D.**—La causa y el significado del macropterismo y braquipterismo en ciertos Tisanopteros, y descripcion de una nueva especie Mexicana. [An. Esc. Nac. Cien. Biol. Mex] 1: 497-505, ill. Un nuevo Teuchothrips (Thysanoptera) procedente de Mexico. [An. Esc. Nac. Cien. Biol. Mex] 1: 507-511. **Kimmins, D. E.**—A revision of the osmylid sub-families Stenosmylinae and Kalosmylinae. [71] 42: 165-201, ill. **Spieth, H. T.**—The North American Ephemeropteran types of the Rev. A. E. Eaton. [7] 34: 87-98, ill. **Stahler, N.**—The life history of Phloeothrips (Hoplandrothrips) sycamoremsis (Thysanoptera). [55] 17: 31-33. **Tjeder, B.**—Some remarks on "The generic names of the British Neuroptera." [28] 62: 24-31, ill. Revisions of the Scandinavian Neuroptera (s. str.) and Mecoptera recorded by J. W. Zetterstedt, H. J. D. Wallengren and others. [Opuscula Ent.] 5: 67-114. **Walker, E. M.**—New record of Odonata from Manitoba. [4] 73: 35-36.

**ORTHOPTERA.—da Costa Lima, A.**—Um novo grilo cavernicola de Minas Gerais. (Phalangopsitid.). [Pap. Avul. Dept. Zool., Sao Paulo] I: 43-49, ill. **Dampf, A.**—Un caso de fitomimetismo en un Ortoptero Mexicano. [An. Esc. Nac. Cien. Biol. Mex.] 1: 525-532, ill. **Ebner, R.**—Orthopterologische studien in Sud-Portugal. [Broteria] 10: 5-28, ill. **Flock, R. A.**—The field roach, Blatella

vaga. [12] 34: 121. **La Rivers, I.**—Response of Anabrus simplex to temperature. [12] 34: 121-122. **Rehn, J. A. G.**—Two new Ommexychid locusts of the genus Parossa, with a key to the species (Acrididae). [Notulae Nat.] No. 79: 11 pp., ill. **Rehn, J. W. H.**—A new genus of mellierid mantid from Venezuela (Manteid.). [Notulae Nat.] No. 70: 4 pp., ill. **Rehn & Rehn.**—The Orthoptera of the Philippine Islands, Part II. Acrididae; Cyrtacanthacrid; group Cyrtacanthacrides. [Proc. Acad. Nat. Sci. Phila.] 92: 245-287, ill. **Roberts, H. R.**—A new species of Philocleon from Mexico (Acridid.). [Notulae Nat.] No. 76: 4 pp., ill.

**HEMIPTERA.—Balduf, W. V.**—Life history of Phymata pennsylvanica americana (Phymat.) [7] 34: 204-214. **Cooper, K. W.**—Davispia bearcreekensis, a new cicada from the paleocene, with a brief review of the fossil Cicadidae. [Amer. Jour. Sci.] 239: 286-304, ill. **da Costa Lima, A.**—Novo Hemiptero Reduviideo da sub-familia Vesciinae. [Arq. Zool. Est. Sao Paulo] 1: 485-490, ill. **Um novo** Ceroplastes gigante (Coccid.). [Pap. Avul. Dept. Zool., S. Paulo] 1: 9-11, ill. **Craig, F. W.**—Observations on the periodical cicada. [12] 34: 122-123. **Davis, W. T.**—New Cicadas from North America with notes. [6] 49: 85-99, ill. **DeLong, D. M.**—The red-banded Osbornellus spp. of the auronitens group occurring in the United States (Cicadellidae). [7] 34: 179-180, ill. (*). The gen. Prescottia (Cicadellidae) in North America. [7] 34: 181-182, ill. (*). A n. gen. (Knullana) and two n. spp. of leafhoppers (Cicadellidae) from Mexico. [43] 41: 86-88, ill. Los Phlepsidos (Phlepsius y Texananus) de Mexico (Cicadellid.). [An. Esc. Nac. Cien. Biol. Mex.] 1: 379-404, ill. **DeLong & Knull.**—Two n. spp. of Osbornellus from the southwestern United States. (Cicadellidae). [7] 34: 177-178, ill. **Ferris, G. F.**—Contributions to the knowledge of the Coccoidea. IX. A forgotten genus of the family Margarodidae. X. Illustrations of eleven genotypes of the Diaspididae. XI. A new genus in the Pseudococcidae. [117] 6: 6-28, ill. A new species of Stomacoccus. [117] 6: 29-32, ill. **Hungerford, H. B.**—A remarkable new Naucorid water bug. [7] 34: 1-4, ill. **McKenzie, H. L.**—A new species of the genus Matsucoccus attacking Pinon Pine in California [117] 6: 2-5, ill. **Ossiannilsson, F.**—Some new Fulgorina (Homoptera) from Java and South America. [Opuscula Ent.] 5: 41-46, ill. **Pelaez, D.**—Los estadios ninfales de Umbonia

crassicornis. [An. Inst. Biol. Mex.] 11: 611-632, ill. **Ruckes, H.**—Note on the feeding habits of Brochymena carolinensis in Florida (Pentatomidae). [19] 36: 27-28. **Usinger, R. L.**—Key to the subfamilies of Naucaoridae with a generic synopsis of the new subfamily Ambrysinae. [7] 73: 5-16, ill.

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THE EMBRYOLOGY OF INSECTS AND MYRIAPODS. The developmental history of insects, centipedes, and millipedes from egg desposition [sic] to hatching. By OSKAR A. JOHANNSEN, Professor of Entomology, Emeritus, Cornell University, and FERDINAND H. BUTT, Instructor in Insect Morphology, Embryology, and Histology, Cornell University. First edition. McGraw-Hill Book Co., Inc., New York and London, 1941. Pp. xi, 462, 370 figs. $5.00—This book is, we believe, the first in English, if not in any western European language, dealing exclusively with the comparative embryology of insects and myriapods. As such it is of first rate importance. It is based on instruction given for more than twenty years at Cornell University. It summarizes a wide range of literature; the bibliography occupies 37 pages (417-453) and contains perhaps 850 titles; few, if any, of importance are lacking. It is divided into two parts, which may be called general (pp. 1-164) and special (pp. 165-415) embryology. Chapter II, A type of embryonic development in insects (pp. 9-23), follows through "a brief outline of the development of a typical insect from the time of maturation of the egg nucleus to the emergence of the larva from the egg. . . . This account does not apply to any specific insect but rather to a generalized type that possesses characteristics common to many insects in most particulars." With this as a starting point, the reader is prepared for more detailed accounts of the egg, its differentiation, fertilization, maturation and cleavage (Chap. III), blastoderm, germ band, segmentation and the appearance of appendages (IV), embryonic membranes, dorsal organs and blastokinesis (V), gastrulation and germ layers (VI), development of the alimentary canal (VII), the ectodermal (VIII) and mesodermal (IX) derivatives. Chap. X is concerned with polyembryony and parthenogenesis, XI with micro-organisms in the egg and XII with experimental embryology (pp. 144-164). Part I is illustrated by 62 figures, of which 34 are described in the preface as copies of diagrams used in the authors' classes; the remaining 28 are taken from the writings of well-known embryologists from Hertwig, 1881, to Seidel, 1935. Part II consists of summaries of the embryonic development of representatives of

taxonomic groups as described in the literature, and in original work of the junior author. "By the selection of illustrative species in the second part which are not especially stressed in the first part, undue repetition is avoided." Part II, therefore, will be very useful to those who have not easy access to the scattered memoirs upon which it is based. The taxonomic headings of its chapters, the examples described, the authors chiefly followed, their dates, and the number of figures drawn from their works are as follows. Chap. XIII. Oligoentomata and Aptilota: The springtail, *Isotoma cinerea*, Philiptschenko, 1912 37 figs.; *Campodea staphylinus*, Uzel, 1898, 9 figs.; the silver fish, *Lepisma saccharina*, Heymons, 1897, 4 figs. XIV. Ephemerida, Odonata, Plecoptera, Embiaria, Dermaptera, Hemimerina: the may fly, *Ephemera vulgata*, Heymons, 1896; dragonflies and damselflies, *Libellula pulchella*, *Erythemis simplicicollis*, *Plathemis lydia*, Butt, new, 12 (really 19) figs., *Calopteryx*, Brandt, 1869, 2 figs. (really 6, old stand-bys in embryological literature!), the stone fly, *Pteronarcys proteus*, Miller, 1939; *Embia uhrichi*, Kershaw, 1914, 1 fig. (so numbered, really 16); the earwig, *Forficula auricularia*, Heymons, 1895; *Hemimerus talpoides*, Heymons, 1912. XV. Orthopteroidea (Panorthoptera): *Paratenodera sinensis*, Hagan, 1917; the Croton bug, *Blattella germanica*, Wheeler, 1889, 1 fig., and L. C. Pettit, new, 4 figs.; the termite, *Eutermes rippertii*?, Knower, 1900, 4 figs.; the walking stick, *Carausius morosus*, Leuzinger, Wiesmann and Lehmann, 1926, 1 (really 5) fig.; the African migratory locust, *Locusta migratoria migratorioides*, Roonwal, 1936, 30 figs.; the differential locust, *Melanoplus differentialis*, Nelsen, 1934. XVI. Oligonephridia Copeognatha, Anoplura, Thysanoptera, Hemiptera): a viviparous psocid, *Archipsocus fernandi*, Fernando, 1934, 8 figs.; the head louse, *Pediculus humanus capitis*, Scholzel, 1937, 6 figs.; the pigeon louse, *Lipeurus baculus*, Ries, 1931, 1 fig.; the guinea pig louse *Gyropus ovalis*, Strindberg, 1916; thrips, *Thrips physapus*, Uljanin, 1874; aphids, Toth, 1933, 6 figs., Will, 1883, 2 figs. (really 6), Webster and Phillips, 1912, 7 figs.; *Siphanta acuta*, Muir and Kershaw, 1912, 5 figs.; the fire bug, *Pyrrhocoris apterus*, Seidel, 1924, 6 figs : the milkweed bug, *Oncopeltus fasciatus*, and *Anasa tristis*, Butt, new, 5 (really 10) figs.; a polyctenid, *Hesperoctenes fumarius*, Hagan, 1931, 2 figs. XVII. Neuroptera and Coleoptera: the alder fly, *Sialis lutaria*, Strindberg, 1915, 2 figs.; the pearl-eye, *Chrysopa perla*, Tichomirowa, 1890, 1892, Bock, 1939; *Stylops*, Noskiewicz and Poluszynski, 1927, 17 figs.; the alfalfa snout beetle, *Brachyrhinus ligustici*, Butt, 1936 and

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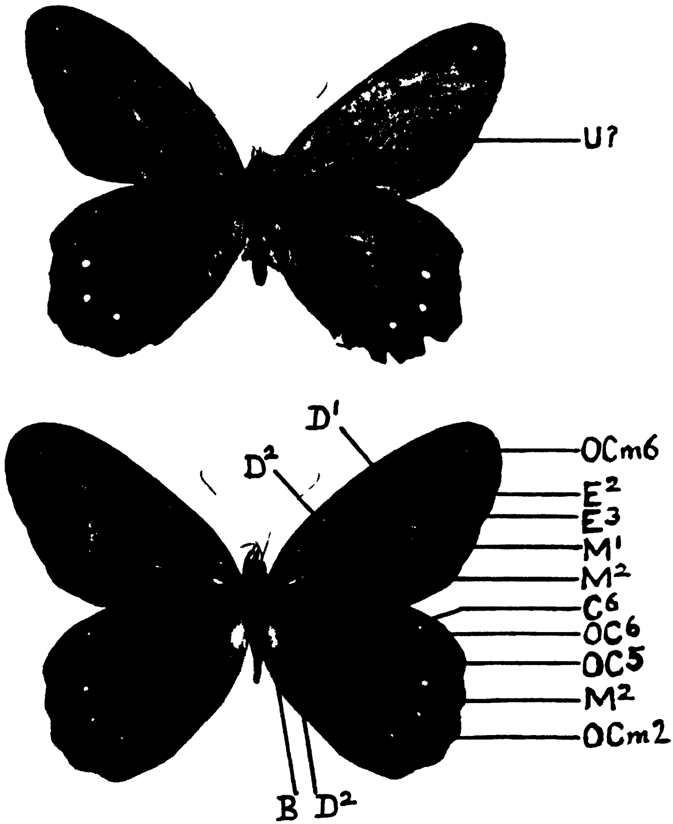
## OBITUARY

Dr. HUGO KAHL, curator of entomology at the Carnegie Museum, Pittsburgh, until last January when he became curator emeritus, died on February 19, in his eighty-second year.—*Science*, April 18, 1941.




LINE-ELEMENTS IN BUTTERFLY PATTERNS.—Forbes.

*Pterella astyoche*, natural size.

Upper figure: Variety without line elements. Lower figure: Normal pattern.—(Bodenstein photo.)

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# Line-Elements in Butterfly Patterns (Lepidoptera: Nymphalidae).

By WM. T. M. FORBES, Cornell University, Ithaca, New York.

(With Plate II.)

The pattern of the higher butterflies, and in particular of the Nymphalidae, (sensu lato) has been analysed into its chief components by Schwanwitsch, in a series of recent papers, of which I may mention especially one on the Pierella group of Satyrids, in the Zeits. Morph. Ökol. Tiere, x, pp. 433, ff., 1928. Since this system is less well known in this country than the pattern scheme of the Noctuid moths, I may present his system and tabulate the relations of the two. We may divide the pattern elements into four groups, *lines, spots, reactions* and longitudinal elements. The first are essentially transverse, and form a system each member of which is in some ways a mirror image of the one on each side of it. They comprise Schwanwitsch's E, M and B elements. The markings I call *spots* differ in being associated with single veins or interspaces, either limited between them, or only transgressing a little. They are his OC and D. The markings that I propose to call *reactions* are of a less definite character. While having a place in the patterns they are apt to lack sharp boundaries, and may be strongly influenced by neighboring patterns of a more definite character. Notable among these are elements U and G, but even more plastic elements of the same type are the numerous variations of ground color limited by the more positive pattern elements, and the shades of contrasting color which define the latter.

Some pattern elements do not lie quite sharply in one or other of these classes. Thus the terminal line ($E^1$ of Schwanwitsch) is controlled by the vestigial ambient vein, and accordingly shows the simplicity of a longitudinal element (V or I of Schwanwitsch), not entering into the mirror symmetry of the typical line elements. $E^2$ also tends to fade out, and might

better be treated as a "reaction," but $E^3$ is a typical member of the line system. The ocelli (OC) are also surrounded by outer circles in many cases, the circuli (C) of Schwanwitsch, and we shall see that in one important way these circuli behave like lines, rather than the spots that they appear to be.

These pattern elements correspond rather closely to the familiar Noctuid pattern as the following table will show.

| *Nymphalidae* | *Noctuidae* |
|---|---|
| $E^1$ Externa | Terminal |
| $E^2$ Externa | (Adterminal, or so-called subterminal of Notodontidae, etc.) |
| $E^3$ Externa | Subterminal (inner st. of some families) |
| OC Ocelli | Wanting |
| C Circuli | Wanting |
| U Umbra | Wanting or fused with st. |
| $M^1$ Media | Transverse posterior (Postmedial) |
| $G^1$, $G^2$ Granulosae | Media |
| $M^2$ Media | Transverse anterior (Antemedial) |
| $D^1$ Discal | Reniform |
| $D^2$ Discal | Orbicular |
| $D^2$1 (part of discal lying below Cu) | Perhaps the Claviform |
| B Basal | Basal (Half-line) |

Certain differences are clear, to be sure. Firstly the second discal of the Nymphalidae lies basal to the inner media; in all moths, so far as I know, the orbicular lies distal to the antemedian, but this is to be expected, since the position of the orbicular is controlled by the forking of the median vein in the cell and this takes place much nearer the base in the butterflies. Then the granulosa, when present, is commonly divided into two bands, one accompanying each media, and if undivided forms a general filling of the median area, while the "media" of the Noctuidae is a narrow, though diffuse line. The homology of the claviform with the lower part of the inner discal can only be called doubtful, and the subterminal element in those higher Noctuidae that we think of as typical is single, and does not enter the symmetry system of the other lines,— but this last can be explained as the result of fusion of $E^3$ (clearly present in many more primitive Lepidoptera) with

$E^2$, U or both. Most striking is the total absence of the OC system, but this last has not been identified yet, even in other butterflies.

The normal specimen of *Pierella astyoche* shown here (Plate II, lower figure) shows the following pattern-elements, using Schwanwitsch's formula:

$$\frac{E^2\ E^3\ OCm6\ M^1\ D^1\ M^2\ D^2}{E^2\ E^3\ OCm2, 3, 4\ OC5, 6, 7, M^1\ D^1\ M^2\ D^2\ B1}$$

But the following points should be noted in which I differ from Schwanwitsch: I take the outer of the two lines across the wing at ¾ to be the innermost externa, rather than umbra. It shows every feature of a true line-element (as will be noted below), there is no other element to represent $E^3$, and as Schwanwitsch has noted himself in the case of *Prepona* (Acta Zoologica xi, 263 ff, 1930) it is perfectly possible for a line to cross the series of ocelli, leaving both intact;—in fact OC7 still lies on the basal side of the line. Further I take the minute dot near the base of fore wing below and the corresponding three dots on the hind wing to be dislocated parts of $D^2$, and only the little bar from the fold to the inner margin to be truly B. Note also what Schwanwitsch calls the *pierellization* of $M^2$ in the fore wing,—i. e., that the part of it below the cell is completely cut off from the upper part and has dropped back into perfect line with $D^2$.

The upper specimen figured on Plate II illustrates and dramatizes this interpretation. If this is correct every line-element in the pattern has dropped out, doubtless as the result of a single factor-change, while every spot-element is intact. It is for this reason I interpret all the black dots[1] at the base of the wings as parts of $D_2$, since they remain, while the little basal line has vanished. It is also possible that the reaction-elements survive, somewhat blurred, since the position of $E^2$ is taken by a distinct though diffuse band, and where the umbra should be there is a very perceptible dark cloud.

A further point of interest is the *circuli*, the black rings surrounding ocelli 5, 6 and 7 on the hind wing. These have completely disappeared in the upper specimen, leaving the

black ocellus proper undefined. This implies that these circuli may yet turn out to be morphologically line-elements, formed much as Schwanwitsch explains the similar but empty circles on the fore wings of many Preponas (1. c. pp. 323-330, figs. 33 etc., $E^3c$). If this is true it may help us in connecting the Nymphalid pattern to that of lower butterflies, and especially the Papilionidae, where ocelli as such do not appear. We may suggest, for instance, that the white or blue pupils of the ocelli represent vestiges of the blue submarginal spots of the Parnassiinae, and that their red or orange bands appear vestigially in the yellow rings that so often (also here) appear between the ocellus proper and its circulus. Another point of likeness is that, as in some other species of *Pierella, Papilio* and at least many of the other Papilionidae have the postmedial ($M^1$) of the fore wing "pierellized," as rather plainly shown in *Thais rumina* and *Papilio machaonides*. This latter point may do much to clear up Schwanwitsch's difficulty with the fore wings of the Papilionidae.

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HOW TO MAKE AN INSECT COLLECTION. Containing suggestions and hints designed to aid the beginning and less advanced collector. This booklet is based on the experience and methods developed during years of collecting insects by members of WARD'S ENTOMOLOGICAL STAFF. Published in the service of Entomology by Ward's Natural Science Establishment, Inc. 302 Goodman St., North, Rochester, New York, 1940. 32 unnumbered pages, 43 figures. It is stated that this booklet is designed to replace *Directions for Collecting and Preserving Insects*, by Dr. A. B. Klots, which is now out of print. The extensively illustrated text gives directions and suggestions for collecting, killing, pinning, mounting, labeling, displaying, rearing, identifying and caring for insects. It should be very helpful to all interested in this subject.—P. P. CALVERT.

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[1] A similar disruption of the orbicular ($D^2$) appear in several Amathusiinae, and strikingly in the fore wing of *Enispe cycnus*. In *Pierella ocreata* these markings have fused into an apparent complete basal line, but the portion belonging to $D^2$ is more intensely black than the fragment of true B.

# Additions to the List of Nevada Dragonflies (Odonata).

By Ira La Rivers, Reno, Nevada.

(Continued from page 130.)

## Subfamily Agriinae.

Agrion aequabile (Say) — Humboldt County (near National).

**A. maculatum Beauvais—Elko County (Rowland).

Hetaerina americana (Fabricius)—Nye County (Beatty).

## Subfamily Lestinae.

Lestes congener Hagen—Churchill County (Carson Lake, Fallon, Lahontan Reservoir); Douglas County (Gardnerville); Lyon County (Lahontan Reservoir); Washoe County (Verdi, Washoe Valley).

L. unguiculatus Hagen—Churchill County (Carson Sink, Fallon, Humboldt Sink); Washoe County (Washoe Valley).

**L. forcipatus Rambur—Esmeralda County (Boundary Peak).

L. dryas Kirby—Churchill County (Carson Lake, Carson Sink, Fallon); Lyon County (Yerington); Pershing County (Rye Patch Reservoir[1]); Washoe County (Washoe Valley). Previous records as *L. uncatus*.

## Subfamily Coenagrioninae.

Argia alberta Kennedy—Eureka County (near Beowawe).

A. emma Kennedy—Churchill County (Fallon, Humboldt Sink); Douglas County (Gardnerville); Lyon County (Wabuska); Humboldt County (Paradise Valley); Pershing County (Humboldt Sink); Washoe County (Dry Lake).

A. vivida Hagen—Esmeralda County (Fish Lake Valley); Lyon County (Wabuska); Nye County (Beatty); Washoe County (Truckee Meadows).

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[1]The Rye Patch Reservoir locality for this species was erroneously listed as being in Churchill County in the first list.

AMPHIAGRION SAUCIUM (Burmeister) — Churchill County (Carson Lake, Carson Sink, Fallon, Lahontan Reservoir); Douglas County (Gardnerville); Humboldt County (Paradise Valley); Lyon County (Lahontan Reservoir, Mason Valley); Washoe County (Washoe Valley).

ENALLAGMA BOREALE Selys—Douglas County (Genoa, Glenbrook); Lyon County (Sweetwater); Ormsby County (Lake Tahoe, Marlette Lake); Washoe County (Lake Tahoe, Verdi).

E. CLAUSUM Morse—Washoe County (Washoe Valley).

**E. CYATHIGERUM (Charpentier)—Douglas County (Lake Tahoe); Esmeralda County (Boundary Peak); Ormsby County (Lake Tahoe, Marlette Lake); Washoe County (Lake Tahoe, Marlette Lake).

E. CARUNCULATUM Morse—Churchill County (Fallon, Lahontan Reservoir); Lyon County (Fernley, Lahontan Reservoir, Yerington); Washoe County (Washoe Valley).

E. CIVILE (Hagen)—Douglas County (Gardnerville); Lyon County (Smith Valley, Sweetwater); Washoe County (Truckee Meadows, Washoe Valley).

E. PRAEVARUM (Hagen)—Esmeralda County (Fish Lake Valley); Nye County (Beatty).

E. ANNA Williamson—Churchill County (Fallon, Humboldt Sink, Lahontan Reservoir); Douglas County (Gardnerville); Lyon County (Sweetwater, Wabuska); Washoe County (Washoe Lake).

ISCHNURA DENTICOLLIS (Burmeister)—Churchill County (Carson Sink, Fallon, Lahontan Reservoir); Lyon County (Fernley, Yerington); Pershing County (Rye Patch Reservoir; Washoe County (Washoe Valley).

I. PERPARVA Selys — Churchill County (Fallon, Lahontan Reservoir); Douglas County (Gardnerville); Lyon County (Smith Valley, Yerington); Humboldt County (Paradise Valley); Pershing County (Lovelock, Mill City); Washoe County (Franktown).

I. CERVULA Selys — Churchill County (Fallon, Lahontan Reservoir); Douglas County (Gardnerville); Lyon County (Fernley, Smith Valley, Sweetwater, Yerington); Mineral

County (Schurz); Washoe County (Washoe Valley).

The total number of species now known to the author for Nevada is 78.

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## Some New Syrphid Flies from North and South America (Diptera).

By FRANK M. HULL, University of Mississippi.

In this paper I present the descriptions of several new world species of Syrphidae. Two of these I collected on low growing herbage about the clearings of Barro Colorado Island. Others have been received from various sources. Types, unless otherwise stated, are in the author's collection.

**Planes chrysopressa** n. sp.

Related to *vagans* Wied. Distinguished by the pile of the third and fourth abdominal segment; face black, a brownish-yellow stripe from eye to epistoma; mesonotum blackish and opalescent with a pair of stripes of yellow pile.

♀. Length 7 mm. *Head*: the vertex is shining brownish-black, the upper portion of the occiput dark brassy brown; viewed from the side it is covered with yellow pubescence. The upper part of the front is shining brassy black, bare of pubescence; there is a broad pale yellowish-brown transverse band of pubescence from eye to eye across the middle of the front, down the middle of which runs a very narrow almost bare line; the extreme lower front above the antennae is shining and bare of pubescence except for a narrow extension from the transverse band above it. Face metallic brassy black in ground color, except that along the anterior margin and front of the cheeks is a light brownish-yellow diagonal band from eye to epistoma. The face is broadly covered with pale yellow pubescence from lower edge of front down to the oral margin. Antennae elongate, the third joint half again longer than the first two joints, dark brown in color the arista pale yellowish brown. Pile of vertex and front light brassy yellow.

*Thorax;* mesonotum shining brownish black with a translucent coppery luster, a prominent almost whitish patch of pubescence on the inside of the humeri and viewed from behind a pair of widely separated, conspicuous, light silky yellow, short pilose vittae, that do not appear unless viewed in the proper light, and which run from the anterior margin back to where they are confluent with a wide, transverse area of similar pile lying in front of the scutellum. Between the pair of longitudinal vittae there is a much narrower, shorter median vitta of pile. Also on the posterior margin of the transverse suture there is a similar band of brassy pile confluent with the longitudinal stripes. Between all of these areas of pale pile there is considerable dense short black pile. Pile of the pleurae wholly pale yellowish beneath which is almost whitish pubescence. Scutellum brassy, almost coppery-black, with short pale pile and a pair of very delicate, slender pale yellow bristles on the posterior margin and more anteriorly along the margin two or more pairs of still shorter bristles.

*Abdomen*: first segment shining greyish black, perhaps slightly bluish. Second segment a little longer than wide, almost opaque black but with a faint shining steel-bluish luster present broadly over the middle. There is a small triangular,

sublateral, obscure brownish-yellow spot on either side of the segment, very widely separated; the extreme lateral margin of the segment is bright brassy. Whole of third and fourth segments brilliant brassy or golden, with pile somewhat the same color; the golden pile of the fourth segment is somewhat appressed and directed obliquely towards the midline.

*Legs:* femora black, the apices narrowly yellowish, the hind pair enormously thickened, its pile chiefly pale yellow with, along the ventral edge, numerous short black spines, and just outside of this on the apical portion on the outside several longer black spines and upon the inside five or six still longer ones. Hind tibiae very dark brown, the base almost whitish, the apex with a long sharp spur, the middle and anterior tibiae brown with the basal fourth whitish yellow. Hind tarsi dark brown, fore and middle tarsi with the first two joints quite pale yellow, the remaining joints blackish.

*Wings:* pale grey, the stigma dark brown. *Holotype:* One female. Barro, Colorado, Canal Zone, PANAMA. F. M. Hull collector.

**Planes cuprescens n. sp.**

Fourth abdominal segment sparse, golden, appressed pilose, the third segment brown pilose; mesonotum and scutellum with a strong reddish-brassy lustre. Related to *vagans* Wied., but not closely.

♀. Length 7 mm. *Head:* front and vertex shining black, quite narrow above, barely half as wide as in *chrysopressa,* the middle of the front yellowish-white pubescent, the lower portion shining bare with in the midline a very tiny tubercular bump. In some lights the broad transverse pubescent area is separated by a narrow median line. The pile of the lower half of the front is sparse and pale yellow; of the upper half of front and vertex black. Face extensively pale yellowish white pubescence, the carina not sharply marked, the entire lower half of face in front and along the sides as far back as the edge of the cheeks light brownish yellow. Antennae elongate, the third joint about one and one-half times as long as the first two joints, the apical and dorsal half of the third joint dark brown, the basal and ventral portion light orange, the first two joints light brown, the arista pale yellow, a little darker towards the apex.

*Thorax:* mesonotum with three pairs of longitudinal bands of pile, the ground color of which is light brassy, almost greenish, the middle one of which is very narrow and all three stripes

are evanescent just past the middle of the mesonotum. There is a patch of golden pile on the posterior margin of the notapleurae which is confluent with a similar patch upon the lateral margin of the mesonotum just posterior to the suture. The pile is also brassy in front of each postcallus and in front of the scutellum. The mesonotum is bright brassy for some distance in front of the scutellum and the yellow pile in front of the scutellum gives way to black anteriorly. Between the yellow pilose stripes above described, the mesonotum is coppery in color. Scutellum light brown in ground color with a bright golden luster and sparse pale pile and a single pair of delicate long yellow bristles, and anteriorly one or more pairs of short yellow bristles. Pile and pubescence of meso- and sternopleurae pale yellow, almost white. There is a prominent almost whitish patch of pubescence on the inside of each humeri.

*Abdomen*: first segment light brown, yellowish in the middle with a brassy luster; second segment with a pair of large subrectangular light brownish yellow spots which reach the full width over the lateral margin and, along the margin, extend almost to the extreme end of the segment. These light colored spots are divided by the parallel-sided median anterior prolongation of a dark brown posterior border upon the segment which, however, reaches the lateral margins only very narrowly. The anterior prolongation does not quite reach the anterior margin. Third segment somewhat similar to the second segment, although here the segment is barely wider than long, whereas the second segment is barely longer than wide. The large basal lateral spots are almost as pale as those of the third segment; the median brown prolongation is somewhat evanescent and the posterior marginal spot or band of rich brown nowhere reaches the lateral margin. Fourth segment rich shining brown with slight golden reflections; the pile of the dark brown area of second and third segments sepia in color, that of the paler areas and of the fourth segment sparse, brassy yellow; the pile is flat appressed upon the fourth segment.

*Legs*: hind femora shining black with brassy cast, grossly thickened in the middle, its extreme base brownish, the narrow apex yellowish brown. Fore and middle femora brown, the apex yellowish. Hind tibiae pale yellow basally, brownish on the remainder and the apex has a long sharp spine; the hind tarsi are light brownish yellow, the last two joints dark brown, the whole of the fore and middle tibiae and tarsi pale yellow, their last two tarsal joints barely darker.

*Wings*: almost hyaline, the stigma pale yellow. *Holotype*: one female, Barro, Colorado, PANAMA. F. M. Hull Collector.

**Baccha sepia** n. sp.

Entirely dark, sepia, spatulate flies, except for pairs of small, diagonal, yellowish-brown fascia upon the abdomen. Sides of face and front diffusely brownish yellow; wings dark brown. Suggestive of *gastroctacus* Wied. in the non-petiolate abdomen.

♂. Length 11 mm. *Head*: vertex and all of front except the narrow brownish-yellow sides, dark sepia-brown with pile of the same color. The face is broadly dark brown in the middle and over the tubercle, the color extending down narrowly about the epistoma to cover the cheeks. The sides of the face are broadly brownish-yellow pollinose and this color extends narrowly up along the sides of the front but at the top of the front does not join the extension from the other side. The facial pile is dark brown. The first and second joints of the antennae are brown, the lower basal margin of the short rounded third joint narrowly reddish-brown, the remainder of the third joint and the arista dark brown. The occiput is grey pubescent with a single row of black hairs on the upper third and three or four rows of yellowish white pile below.

*Thorax*: mesonotum bright shining brassy-brown, covered with dark brown pollen and sparse brown pile. There are quite obscure suggestions of narrow vittae upon the thorax; posteriorly there appear to be three narrow shining chocolate pollinose vittae and viewed from in front there appears to be a single narrow black median streak which probably, however, divides the median pollinose vittae into two parts. Scutellum light brown, the immediate base very narrowly yellowish-brown, the discal pile sparse, long, delicate and black. The ventral fringe pile consisting of seven very long, blackish hairs.

*Abdomen*: spatulate; but little less wide upon the base than upon the apex. The second segment is barely longer than the third; the third segment one-sixth or one-eighth longer than the fourth segment; fifth segment not quite as long as wide; the first segment is quite short. The color of the abdomen is dark sepia-brown and shining, barely lighter upon the second and third segments. The pile upon the first and second segments is brownish black and the pile upon the posterior part of the abdomen is black. In the middle of the second segment, upon either side, is a diagonal, long, quite slender brownish-yellow fascia that fails to reach the margin and does not join the midline. Just before the middle of the third segment there is a fascia similar in every respect, except that it is wider upon

its inner or median half and in fact is gradually drawn out from its medial wider base to a narrow point as it approaches the line of the margin which it does not reach. Upon the fourth segment just before the middle is a similarly colored, though slightly darker, small, irregularly triangular-shaped spot. Upon the fifth segment, separated by a distance equal to those of preceding spots is a pair of brown, basal, elongate, small spots which are drawn out posteriorly.

*Legs*: the femora are quite slender, dark brown and blackish-brown pilose, the apices of the middle femora lighter brown and the fore pair of femora are noticeably lighter in color than the hind pair. Fore and middle tibiae light brown with a suggestion of a obscure narrow darker annulus near the middle. The hind tibiae are wholly blackish brown with similarly colored pile. All of the tarsi except the basal two-thirds of the hind basal tarsi are light brownish yellow with similarly colored pile.

*Wings*: broad, but the alula narrow and strap-like; the entire wing including the whole of the stigmal cell is deeply suffused with brown.

*Holotype*: one male. Sao Paulo, BRAZIL, April 6-8, 1934. J. Lane collector. *Paratype*: one male in Lane's collection; same data.

**Mixogaster johnsoni** n. sp.

This species is related to *breviventris* Kahl, but the antennae are lighter; the yellow, lateral, thoracic stripe is interrupted and the pattern of the abdominal spots differs.

♀. 10 mm. exclusive of antennae. *Head*: face pale yellow, the cheeks and a median stripe dark brown. Front and vertex dark blackish brown. A pale yellow spot on the eye margins opposite the ocelli and the transverse black band in front of antennae pitted. Antennae black, the base of the third joint narrowly orange and the first two joints dark brown.

*Thorax*: Mesonotum dully shining black, the humeri, a small spot just before and behind the suture, the postcalli, all of the scutellum except the posterior corners, a prominent vertical stripe on mesopleurae, sternopleurae and almost the whole of the metapleurae pale yellow. A large red spot on the middle of the pteropleurae confluent with the metapleural yellow spot. Metanotum black.

*Abdomen*: black with slender post marginal yellow borders that expand a little in the posterior corners. First segment almost wholly black, the anterior corners of the second segment obscurely and diffusely yellowish, merging into red and then into black.

*Legs.* chiefly light reddish brown, the basal two-thirds or less of the hind tibiae or more of the middle tibiae, the apex of the middle femora, front femora and basal half of the front tibiae pale yellow. Tarsi brownish but light in color.

*Wings*: hyaline, appearing grey from dense grey vittae. The veins very narrowly and inconspicuously margined with brown without definite anterior brown borders.

*Holotype:* One female, Dennisport, MASSACHUSETTS, Sept. 3, 1935 (J. Bequaert); this specimen is in the collection of the author, presented to the author through the kindness of Dr. Bequaert. *Paratypes:* One female from Lucaston, NEW JERSEY, Aug. 27, C. W. Johnson collector; this is in the Museum of Comparative Zoology; a specimen in the Boston Society of Natural History from Wallingford, CONNECTICUT, July 1, 1922; the Museum of Comparative Zoology at Harvard contains a specimen from Nantucket, MASSACHUSETTS, Sept. 8. All four specimens are females.

On the suggestion of Mr. Nathan Banks, I take pleasure in naming this species in honor of the well known dipterist, Dr. C. W. Johnson, to whom I owe much for early encouragement in the study of Diptera.

## Two New Species of Hesperiidae from North America. (Lepidoptera).

By E. L. BELL, Flushing, New York.

Undescribed species of *Hesperiidae* still turn up occasionally in the North American fauna despite the fact that the butterflies of this region have been extensively collected and studied for a great many years. This is partially due to the close superficial resemblance of the overlooked species to other closely related species which have already been described and because they occur in areas not usually visited by collectors or by those collectors not interested in collecting *Hesperiidae*.

Many species of *Hesperiidae* are quite locally restricted to a certain type of environment and this may occupy a very limited area and be easily passed by. Our southern and southwestern States seem still to offer interesting possibilities for

the collector, as they apparently contain large areas over which little if any collecting has been done.

ANTIGONUS PULVERULENTA Felder (Fig. 1).

1869. *Leucochitonea pulverulenta* Felder, Verhandlungen der Kaiserlich Königlichen Zoologisches-Botanischen Gesellschaft in Wien, xix, p. 478. Orizaba, Mexico.

1876. *Hesperia zampa* Edwards, Transactions American Entomological Society, v, p. 207. South Apache, Arizona.

1884. *Tagiades taeniatus* Plotz, Jahrbücher des Nassauischen Vereins für Naturkunde, xxxvii, p. 41. Oaxaca, Mexico.

1895. *Systasea pulverulenta* Godman and Salvin, Biologia Centrali-Americana, Rhopalocera, ii, p. 413; pl. 87, figs. 24, 25. Arizona; Mexico; Guatemala.

1923. *Systasea pulverulenta* Draudt, in Seitz Macrolepidoptera of the World, v, p. 904; pl. 176e.

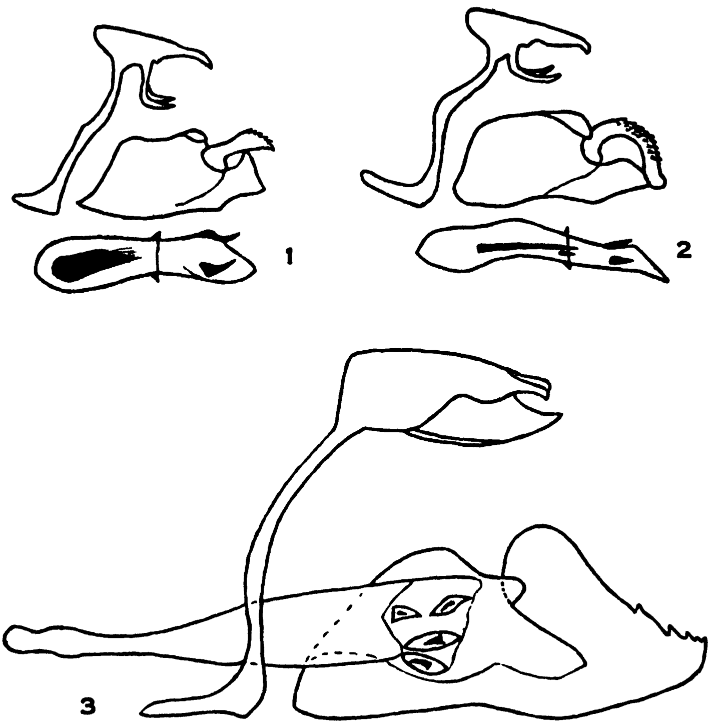
1923. *Systasea pulverulenta* Skinner and Williams, Transactions American Entomological Society, xlviii, p. 299; p. 300, fig. 23 male genitalia.

1930. *Systasea pulverulenta* Holland, Butterfly Book, Revised Edition, p. 344; pl. 46, fig. 1 type of *Hesperia zampa* Edwards.

Brigadier W. H. Evans of the British Museum has called the attention of the writer to the fact that two species have been confused under the name *pulverulenta* and that these two species while quite similar in appearance have a constant difference in the maculation of the primaries and a different form in the male genitalia.

Examination of a considerable number of specimens in the collections of the American Museum of Natural History, the Academy of Natural Sciences of Philadelphia and the National Museum in Washington shows Brigadier Evans to be correct, and that *pulverulenta* appears to be the predominant species in Mexico, extending into the United States in Texas and Arizona. Only one specimen of the other species was found bearing a Mexican label and that Sonora, in the northern part of the Country.

The specimens of *pulverulenta* which were examined came from the following localities: TEXAS: Corpus Christi, San Antonio, Kerrville, Sabinal, Brownsville, Del Rio, New Braun-




Genitalia of: 1. *Antigonus pulverulenta* Felder, 2. *Antigonus evansi* n. sp., 3. *Atrytone berryi* n. sp.

fels: ARIZONA: Tucson MEXICO: Jalapa, Chichen Itza, Rinconada, Oaxaca, Mazatlan, Misantla.

The genitalia of a male specimen from San Antonio, Texas, are figured. The apex of the claspers is very broad, the lower corner produced into a short triangle, the upper into a broad triangular tooth, above which a broad dorsal arm projects obliquely outward, extending a little beyond the apex and carrying some small dorsal teeth in the apical part. The aedoeagus is very large and carries a huge cluster of internal spines near the base and has two horn-like projections near the apex.

**Antigonus evansi** new species (Fig. 2).

It is this insect which so closely resembles *pulverulenta* Felder and has been confused with it. In general most speci-

mens of *evansi* are of a somewhat lighter shade of color and average slightly larger in size than *pulverulenta* but both species are variable in these characters and reliance cannot be placed upon them for accurate identification.

In *evansi* the cell spot of the discal band of the primaries and the spot immediately below it, in interspace 2, are not in a straight line on their inner edges but that edge of the spot in interspace 2 is always further inward toward the base of the wing and the continuity of the band is thus broken at this point. In *pulverulenta* the inner edge of these two spots forms an even line and the band is not broken at the point of junction. This difference seems to be the only outstanding superficial character by which the two species may be separated.

The figure of the male genitalia is from a specimen from Texas. The claspers terminate in a bluntly triangular apex, back of which rises a very long dorsal arm, curving outward and then downward with its rounded tip extending over the apex of the clasper. The aedoeagus is a little longer and less thick than in *pulverulenta* and instead of the very large cluster of internal spines of that species, carries one very long heavy spine (or perhaps a narrow, closely appressed cluster) and one small spine. The two horn-like projections near the apex are also much less developed in *evansi*.

Brigadier W. H. Evans of the British Museum has called the attention of the writer to the fact of the confusion of this species with *pulverulenta* and it is with great pleasure that the new species is named for him.

Expanse: male, 25 mm. to 36 mm., female, 36 mm. to 38 mm.

*Type material.—Holotype* male, Baboquivari Mountains, ARIZONA; *allotype* female, El Paso, TEXAS, in collection of the American Museum of Natural History. *Paratypes*: 84 males and 10 females distributed as follows, 24 males, 2 females, American Museum of Natural History; 19 males, 2 females, Academy of Natural Sciences of Philadelphia; 9 males, 6 females, United States National Museum; 32 males in collection of Cyril F. dos Passos. The paratypes are from the following localities: ARIZONA: (roughly north to south) Coyote Mountains; Verde River, Jerome; Congress Jc.; San

Carlos Lake; wheatfields near Globe; Redington; Tucson; Baboquivari Mountains; Cochise County; Huachaca Mountains, south Arizona. Fresnal Canyon; Tuscon; Paradise; Santa Rita Mountains; TEXAS: Alpine; Big Bend; Davis Mountains. NEW MEXICO: Alamogordo. CALIFORNIA: Palm Springs; San Diego County; Colo. desert of California. Mexico: Sonora; Baja California.

**Atrytone berryi** new species (Fig. 3).

♂. Upper side. Primaries bright fulvous with a broad blackish brown border, a blackish brown spot beyond the end of the cell, base dark brownish and covered with fulvous hairs, inner margin below vein 1 blackish brown with fulvous hairs in the basal half; a broad, black, oblique stigma of two parts across interspaces 1 and 2; two fulvous subapical spots. Fringes pale fulvous or pale brownish fulvous, sometimes becoming whitish at the tip.

Secondaries with broad blackish brown costal and outer borders, abdominal fold blackish brown covered with fulvous hairs; the discal area fulvous, cut into three elongate spots by the black veins; long fulvous hairs extend from the base over and below the cell. Fringes fulvous becoming whitish at the tip.

Under side. Primaries brownish fulvous in the apical half, the base black from the cell downward, a black stripe indicating the stigma of the upper side, inner margin black below vein 1, outer margin black in interspace 1, a black spot in interspace 2 not reaching the margin. Three discal spots and the apical half of the cell brighter fulvous. The lower of the two subapical spots dimly visible.

Secondaries darker fulvous, immaculate; all the veins distinctly paler yellowish fulvous.

Upper side of the body with fulvous brown hairs. Top of head and palpi fulvous or fulvous brown. Beneath the palpi and pectus are fulvous, sometimes a few black hairs in the palpi; thorax fulvous or fulvous brown; abdomen pale fulvous and with or without a narrow, broken, dark central line. Antennae black above, fulvous beneath, the apical part of the club black, the apiculus red.

♀. Upper side. Primaries blackish brown, a discal band of four bright fulvous spots, two in interspace 1, the lower one the larger, the upper one very small and extending further toward the outer margin than the lower one; an oblong spot in interspace 2 beyond the base of the interspace, convex on

the inner side and concave on the outer side; a somewhat wedge-shaped spot in interspace 3; two small, elongate subapical spots of the same color. Fringes sordid brownish.

Secondaries. Blackish brown with or without a small fulvous discal area cut by the veins into three rather hazy, elongate spots. Fringes sordid brownish or dirty whitish.

Beneath. Primaries blackish brown in the basal half below the cell and along inner border except at the extreme outer margin. The discal band and lower subapical spot repeated, paler, the two spots in interspace 1 fused into one large spot and extended to nearly the outer margin and sordid whitish. Secondaries as in the male but a little darker in tone.

Body above with brownish or fulvous brown hairs. Top of head and palpi with brownish and fulvous hairs. Beneath as in the male.

Expanse: male, 36 mm. to 38 mm.; female, 38 mm. to 42 mm.

*Type material.—Holotype* male; Monticello, FLORIDA, March 31 (Engelhardt); *allotype* female; Merritts Island, Brevard County, Florida, September 30, (Berry), in collection of the American Museum of Natural History. *Paratypes;* two males, Orlando, Florida, October 8, one female, same locality, October 17 (Berry), in collection of Mr. Cyril F. dos Passos; one female, Miami, Florida, (Hebard) in collection of the Academy of Natural Sciences of Philadelphia.

It is a pleasure to name this species for Mr. Dean F. Berry of Orlando, Florida, who collected most of the specimens.

On the upper side the appearance of the male is similar to that of *Atrytone conspicua* Edwards but the outer margin of the wings is not quite so rounded and the stigma is slightly thinner than in that species. On the under side the appearance is more similar to that of *Atrytone bimacula* Grote and Robinson, especially in the pale veins of the secondaries but these are pale fulvous in *berryi* and more nearly whitish in *bimacula* and besides *berryi* entirely lacks the white inner margin of these wings, which is so conspicuous in *bimacula.*

The females resemble that sex of *Atrytone arpa* Boisduval and LeConte on the upper side but they are readily distinguished by the entirely different appearance of the under side,

and besides they are of a smaller size than the usual female *arpa*.

The male genitalia differ materially from any of the other closely related species in the genus.

## The Leng Types of Cicindelidae (Coleoptera).

By RICHARD G. DAHL, Oakland, California.

The following is presented in order to designate lectotypes of the species of Cicindelidae described by C. W. Leng in cotype series and to give in detail data concerning these, as well as the other species described by him. The discussion is intended to clarify their present status, and to add further information concerning them.

Lectotypes herewith designated are now located in the collection of M. A. Cazier, unless otherwise stated. Several other Leng types are located in other collections as are noted herein. Thanks are due M. A. Cazier for the generous use of his collection and for his helpful suggestions and assistance. I wish to express my appreciation also to L. L. Buchanan, E. A. Chapin, P. J. Darlington, C. W. Leng, and A. S. Nicolay for their assistance.

1. OMUS INTERMEDIUS Leng. Leng, C. W., 1902, Cic. of Bor. Amer.; Trans. Amer. Ent. Soc. XXVIII, p. 104.

*Discussion:* In the description of this species, C. W. Leng does not mention a type, and I have been unable to locate any specimens with the data as given in his discussion. However, there is a specimen in the E. D. Harris collection, at the Museum of Comparative Zoology, which now stands under *procerus* Casey and is labeled "0/248"; "cotype *intermedius* Leng"; "Colony Mill Rd. n. Kaweah, California, May 1, R. Hopping" and "from C. W. Leng Nov. 1906, this label is his identification of the specimen" and "Nov. 1910 determined by C. W. L. as v. *procerus* Cas." I do not believe this specimen should be known as the type of *intermedius*. It would be wise to have a lectotype designated, should anyone encounter the

material as mentioned by Leng (1902).

2. TETRACHA CAROLINA var. FLORIDANA Leng and Mutchler. Leng, C. W., and Mutchler, A. J., 1916, Desc. Cat. W. Ind. Cic.; Amer. Mus. Nat. Hist., Vol. XXXV, p. 688.

*Type Locality:* Everglade, Florida. *Date:* June, 1912. *Collectors:* sons of Mr. Geo. W. Storter. *Type Now Located:* American Museum of Natural History.

*Discussion:* Evidence shown by C. W. Leng in his description tends to indicate the confinement of this form to one locality, therefore it should be known as *Tetracha carolina* subspecies *floridana.* In collections examined none were found to occur outside the type locality. In this subspecies, the cupreous is completely lost from the head, pronotum, and elytra. Otherwise this form agrees with *carolina.*

3. CICINDELA FORMOSA var. MANITOBA Leng. Leng, C. W., 1902, Cic. of Bor. Amer.; Trans. Amer. Ent. Soc. XXVIII, p. 137.

*Lectotype Locality:* Aweme, Hudson Bay, Manitoba. *Collector:* Norman Criddle.

*Discussion:* Lectotype male designated from a cotype series of six, all from Aweme, Hudson Bay, Manitoba (C. W. Leng collection). This has always been considered a variety, but because of its restricted occurance in the north, it should be known as *Cicindela formosa* subspecies *manitoba.* In this subspecies the widened pattern on the elytra, as well as its restricted distribution, may easily distinguish it from its most closely related form *Cicindela formosa generosa* Dej.

4. C. PURPUREA var. NIGERRIMA *Leng.* Leng, C. W., 1918, New Race of Cicindela, Journ. N. Y. Ent. Soc., Vol. XXVI, p. 139.

*Lectotype Locality:* Oslar; Chimney Gulch, Golden, Colorado.

*Discussion:* Lectotype male designated from a specimen of the series in the C. W. Leng collection. In the assignment of the name to this varital form of *purpurea,* Mr. Leng did not designate a type. The specimen above designated is from the series that was before him at that time. *Cicindela*

*purpurea* var. *nigerrima* is the black form of *Cicindela purpurea* Oliv. and occurs regularly throughout its range.

5. C. PURPUREA var. TRANSVERSA Leng. Leng, C. W., 1902, Cic. of Bor. Amer.; Trans. Amer. Ent. Soc. XXVIII, p. 131.

*Lectotype Locality:* North Illinois.

*Discussion:* Lectotype male designated from a cotype series of eight specimens. Additional cotype specimens from Eureka, Missouri, April 30, 1905 (Smyth); South Orange, New Jersey, September 1, 1888; Colorado; Louisiana, Missouri, September, 1919, (G. M. Dodge); North Illinois, all in the C. W. Leng collection. In the designated lectotype there is a slight indication of the oblique middle lunule present, however in the cotype series, the middle transverse band is shortened and in one specimen almost lacking. At the present this is considered as a variety of *Cicindela purpurea* Oliv.

6. C. PURPUREA var. LUDOVICIANA Leng. Leng, C. W., 1902, Cic. of Bor. Amer.; Trans. Amer. Ent. Soc. XXVIII, p. 132.

*Lectotype Locality:* Vowell's Mill, Louisiana. *Collector:* George Coverdale.

*Discussion:* Lectotype male designated from a cotype series of five all from Vowell's Mill, Louisiana (C. W. Leng collection). In this variety of *purpurea* the blue head and pronotum are contrasted to the purplish margined green elytra. This variety is very distinct, and can hardly be confused with any of its closely related subspecies and varieties.

7. C. TRANQUEBARICA var. MINOR Leng. Leng, C. W., 1910, Journ. N. Y. Ent. Soc. XVIII, p. 80.

*Discussion:* In this variety C. W. Leng did not designate a type or cotypes, but merely described it as "smaller than the northern forms and never metallic or brilliant colored", he also states: "The few specimens found in Georgia were of this small dark form, which has been called *minor* by Mr. Edw. D. Harris."

There is no specimen in the C. W. Leng collection that agrees well enough to be designated as a lectotype of this

form. It is considered at present to be a faint variety of *Cicindela tranquebarica* Hbst.

8. C. TRANQUEBARICA var. HORICONENSIS Leng. Leng, C. W., 1902, Cic. of Bor. Amer.; Trans. Amer. Ent. Soc. XXVIII, p. 145.

*Lectotype Locality:* Lake George, New York. *Date:* August.

*Discussion:* Lectotype male designated from a cotype series of seventeen specimens. Additional cotype specimens are from the following localities; De Bruce, New York, June 11, 1911, (Harris); Bartlett, New Hampshire, June 4, 1915 (Harris); North Illinois; Keene Valley, Essex County, New York, August 17, 24, and 27, 1919 (H. Nortman); Marquette, Michigan; Mount Desert, Maine, August: and Boisdale, C. B., all in the C. W. Leng collection. In the cotype series before me the markings vary considerably. In the designated lectotype the markings are reduced, and in the middle transverse band there is a break just before the point of intersection at the margin. The elytra and pronotum are cupreous, and the impressions of the head are green. The cupreous and the green-bronze color are the only characters to separate this variety from *Cicindela tranquebarica* Hbst. The pubescence of the thorax and abdomen varies as in that of *Cicindela tranquebarica* Hbst.

9. C. TRANQUEBARICA var. SIERRA Leng. Leng, C. W., 1902, Cic. of Bor. Amer.; Trans. Amer. Ent. Soc. XXVIII, p. 146.

*Lectotype Locality:* Sierra County, California. *Collector:* From the collection of Charles Fuchs.

*Discussion:* Lectotype female designated from a series of three specimens. Additional cotype specimens are from Big Trees, Calaveras County, California, and Placer County, California, all in the C. W. Leng collection. In the designated lectotype the color is brilliant green above, with purplish-green reflections beneath; the markings are reduced, with the humeral lunule almost lacking. In the other two cotypes, one is an opaque dark green and the other a sericeous green; the markings on each are represented by a middle transverse band only. This form thus far has been collected only in the Sierra Nevada Range in California, which indicates it deserves the status of *Cicindela tranquebarica* subspecies *sierra* Leng.

(To be continued.)

## List of Titles of Publications Referred to by Numbers in Entomological Literature in Entomological News.

1. Transactions of The American Entomological Society. Philadelphia.
2. Entomologische Blätter, red. v. H. Eckstein etc. Berlin.
3. Annales Sci. Naturelles, Zoologie, Paris.
4. Canadian Entomologist. London, Canada.
5. Psyche, A Journal of Entomology. Boston, Mass.
6. Journal of the New York Entomological Society. New York.
7. Annals of the Entomological Society of America. Columbus, Ohio.
8. Entomologists' Monthly Magazine. London.
9. The Entomologist. London.
10. Proceedings of the Ent. Soc. of Washington. Washington, D. C.
11. Deutsche entomologische Zeitschrift. Berlin.
12. Journal of Economic Entomology, Geneva, N. Y.
13. Journal of Entomology and Zoology. Claremont, Cal.
14. Archivos do Instituto Biologico, Sao Paulo.
15. Annales Academia Brasileira de Sciencias. Rio de Janeiro.
17. Entomologische Rundschau. Stuttgart, Germany.
18. Entomologische Zeitschrift. Frankfurt-M.
19. Bulletin of the Brooklyn Entomological Society. Brooklyn, N. Y.
21. The Entomologists' Record and Journal of Variation. London.
22. Bulletin of Entomological Research. London.
23. Bolletino del Lab. di Zool. gen. e agraria della Portici. Italy.
24. Annales de la société entomologique de France. Paris.
25. Bulletin de la société entomologique de France. Paris.
27. Bolletino della Societa Entomologica Italiana. Genova.
28. Ent. Tidskrift utgifen af Ent. Föreningen i Stockholm. Sweden.
29. Annual Report of the Ent. Society of Ontario. Toronto, Canada.
30. Archivos do Instituto de Biologia Vegetal. R. d. Janeiro.
31. Nature. London.
32. Boletim do Museu Nacional do Rio de Janiero. Brazil.
33. Bull. et Annales de la Société entomologique de Belgique. Bruxelles
34. Zoologischer Anzeiger, hrsg. v. E. Korschelt. Leipzig.
36. Trans. Royal Entomological Society, London. England.
37. Proceedings of the Hawaiian Entomological Society. Honolulu.
38. Bull. of the Southern California Academy of Sciences. Los Angeles.
39. The Florida Entomologist. Gainesville, Fla.
40. American Museum Novitates. New York.
41. Mitteilungen der schweiz. ent. Gesellschaft. Schaffhausen, Switzerland.
42. The Journal of Experimental Zoology. Philadelphia.
43. Ohio Journal of Sciences. Columbus, Ohio.
44. Revista chileña de historia natural. Valparaiso, Chile.
46. Zeitschrift für Morphologie und Ökologie der Tiere. Berlin.
47. Journal of Agricultural Research. Washington, D. C.
50. Proceedings of the U. S. National Museum. Washington, D. C.
51. Notulae entomologicae, ed. Soc. ent. Helsingfors. Helsingfors, Finland.
52. Archiv für Naturgeschichte, hrsg. v. E. Strand. Berlin.
53. Quarterly Journal of Microscopical Science. London.
55. Pan-Pacific Entomologist. San Francisco, Cal.
57. La Feuille des Naturalistes. Paris.
58. Entomologische Berichten. Nederlandsche ent. Ver. Amsterdam.
59. Encyclopédie entomologique, ed. P. Lechevalier. Paris.
60. Stettiner entomologische Zeitung. Stettin, Germany.

61. Proceedings of the California Academy of Sciences. San Francisco.
**62. Bulletin of the American Museum of Natural History. New York.**
64. Zeitschrift des österr. entomologen-Vereines. Wien.
65. Zeitschrift für angewandte Entomologie, hrsg. K. Escherich. Berlin.
**67. University of California Publications, Entomology. Berkeley, Cal.**
68. Science. New York.
69. Physis. Revista Soc. Argentina Cien. Nat. Buenos Aires.
70. Entomologica Americana, Brooklyn Entomological Society. Brooklyn.
71. Novitates Zoologicae. Tring, England.
72. Revue russe d'Entomologie, Leningrad, USSR.
73. Mem. Instituto Butantan. Sao Paulo, Brazil.
75. Annals and Magazine of Natural History. London.
77. Comptes rendus heb. des séances et mémo. de la soc. de biologie. Paris.
78. Bulletin Biologique de la France et de la Belgique. Paris.
79. Koleopterologische Rundschau. Wien.
**82. Bulletin, Division of the Natural History Survey. Urbana, Illinois.**
83. Arkiv för zoologie, K. Svenska Vetenskapsakademien i. Stockholm.
**84. Ecology. Brooklyn.**
87. Archiv für Entwicklungsmechanik der Organ., hrsg. v. Roux. Leipzig.
88. Die Naturwissenschaften, hrsg. A. Berliner. Berlin.
89. Zoologische Jahrbücher, hrsg. v. Spengel. Jena, Germany.
90. The American Naturalist. Garrison-on-Hudson, New York.
91. Journal of the Washington Academy of Sciences. Washington, D. C.
92. Biological Bulletin. Wood's Hole, Massachusetts.
93. Proceedings of the Zoological Society of London. England.
94. Zeitschrift für wissenschaftliche Zoologie. Leipzig.
95. Proceedings of the Biological Soc. of Washington, Washington, D. C.
97. Biologisches Zentralblatt. Leipzig.
98. Le Naturaliste Canadien. Cap Rouge, Chicoutimi, Quebec.
101. Tijdschrift voor entomologie. Nederland. Ent. Ver., Amsterdam.
102. Entomologiske Meddelelser, Entomologisk Forening, Copenhagen.
103. Journal of the Kansas Entomological Society, Lawrence, Kansas.
**104. Revista de la Sociedad entomologica Argentina, Buenos Aires.**
105. Revista de Entomologia, Rio de Janeiro, Brazil.
106. Anales Sociedad Cientifica Argentina, Buenos Aires.
107. Proc., Royal Entomological Society, London.
108. Revista, Col. Nac. Vicente Rocafuerte, Guayaquil.
109. Arbeiten uber morpholog. und taxonom. ent. aus Berlin-Dahlem.
110. Arbeiten ueber physiolog. u. angewandte ent. aus Berlin-Dahlem.
111. Memorias do Instituto Oswaldo Cruz. Rio de Janeiro.
112. Anales del Instituto de Biologia Mexico.
114. Occasional Papers of the Museum of Zoology, University of Michigan.
115. Memorias de la Soc. Cubana de Hist. Nat. Havana, Cuba.
116. Parasitology. Ed. Keilin and Hindle. London.
117. Microentomology, Stanford University.
118. Ward's Ent. & Nat. Sci. Bull., Rochester, N. Y.
119. American Midland Naturalist, Notre Dame, Ind.
120. The Great Basin Naturalist, Provo, Utah.
121. Ciencia, Mexico City.
122. Revista Museo de la Plata, Buenos Aires.
123. Indian Journal of Entomology, New Delhi.

# Current Entomological Literature

**COMPILED BY V. S. L. PATE, L. S. MACKEY and J. W. CADBURY.**

Under the above head it is intended to note papers received at the Academy of Natural Sciences of Philadelphia pertaining to the Entomology of the Americas (North and South), including Arachnida and Myriopoda. Articles irrelevant to American entomology will not be noted; but contributions to anatomy, physiology and embryology of insects, however, whether relating to American or exotic species will be recorded.

This list gives references of the current or preceding year unless otherwise noted. All continued papers, with few exceptions, are recorded only at their first installment.

For records of Economic Literature, see the Experiment Station Record, Office of Experiment Stations, Washington. Also Review of Applied Entomology, Series A, London. For records of papers on Medical Entomology, see Review of Applied Entomology, Series B.

**Note.** References to papers containing new forms or names not so stated in titles are followed by (*); if containing keys are followed by (k); papers pertaining exclusively to neotropical species, and not so indicated in the title, have the symbol (S) at the end of the title of the paper.

**The figures within brackets** [ ] refer to the journal in which the paper appeared, as numbered in the list of Periodicals and Serials published in our January and June issues. This list may be secured from the publisher of **Entomological News** for 10c. The number of, or annual **volume,** and in some cases the part, heft, &c., the latter **within** ( ) follows; then the pagination follows the colon :

**Papers published in the Entomological News are not listed.**

**GENERAL.—Davis, W. T.**—Charles W. Leng and the New York Entomological Society. [6] 49: 189-192, ill. **Kreibohm de la Vega G. A.**—Contribucion al conocimiento de algunos enemigos naturales de la oruga de la hoja del algodonero (Alabama argillacea) Lucha biologica. [Rev. Ind. Y Agric. Tucuman] 30: 163-171, ill. **Leng, C. W.**—Obituary by J. D. Sherman, Jr. [6] 49: 185-187. **McCoy & Carver.**—A method for obtaining spores of the fungus Beauveria bassiana in quantity. [6] 49: 205-210, ill. **de Seabra, A. F.**—A Entomologia do Trigo. [Arq. da Secc. Biolog. e Parasit.] 3: 699 pp. 1939. **Szekessy, W.**—Disputatio physica de insectis von Andreas Horvath. Die erste, von einem ungarn verfasste entomologische abhandlung. [Ann. Mus. Nat. Hung.] 33: 1-13. **Weiss, Soraci & McCoy.**—Additional notes on the behavior of certain insects to different wave-lengths of light. [6] 49: 149-159, ill.

**ANATOMY, PHYSIOLOGY, ETC.—Bucherl, W.**—Sobre a musculatura da Scolopendra viridicornis. [Mem. Inst. Butantan] 14: 65-92. **Cambournac, F. J. C.**—Como os mosquitos transmitem as sezões em condições naturais. [Naturalia, Lisboa] II: 151-159, ill. **Hanstrom, B.**—Inkretorische organe, sinnesorgane und nervensystem des kopfes einiger niederer insektenordnungen. [Kungl. Sv. Vet. Akad. Handlingar] 18: 265 pp., ill. Die chromato-

phoraktivierende substanz des insektenkopfes. [Lunds Univ. Arssk.] 36: No. 12: 20 pp., ill. **Kuhn & von Engelhardt.**—Ein das flügelmuster beeinflussender letalfaktor bei Ptychopoda seriata. [97] 60: 561-566, ill. **Perez, Z.**—Les cellules secretrices du cerveau de quelques Lepidopteres. [An. Fac. Cien Porto] 25: 92-94. **Toth, L.**—The protein metabolism of the aphids. [Ann. Mus. Nat. Hung.] 33: 167-170. **Wagner, E.**—Ueber eine die gonaden beeinflussende mutation von Ptychopoda seriata. [97] 60: 567-589, ill. **Woke, P. A.**—Structure and development of the alimentary canal of the southern armyworm larva. [U. S. Dept. Agric.] Tech. Bull. 762: 29 pp., ill.

**ARACHNIDA AND MYRIOPODA.—Chamberlin, R. V.**—New American millipeds. [Bull. Univ. Utah] 31: 3-39, ill. **da Fonseca, F.**—Notas de Acareologia. Familias genero e especie novos de acarianos parasitas do pulmao de serpentes (Pneumophionyssid. n. fam. e Entonyssid. n. fam.). [Mem. Inst. Butantan] 14: 53-58, ill. Bolivilaelaps tricholabiatus, gen. n., sp. n. (Laelaptid.). [Mem. Inst. Butantan] 14: 59-64, ill. **de Mello-Leitão, C.**—Spiders of the Guiana forest collected by O. W. Richards. [Arq. Zool. Est. de Sao Paulo] II: 175-197, ill. (*). Aranhas do Espírito Santo Coligidas por Mario Rosa, em 1936 e 1937. [Arq. Zool. Est. de Sao Paulo] II: 199-214. (*).

**THE SMALLER ORDERS OF INSECTS.—Geotsch, W.**—Staatengrundung und kastenbildung bei Termiten. [88] 29: 1-13, ill. **Guimarães, L. R.**—Notas sôbre Siphonaptera e redescrição de Polygenis occidentalis. [Arq. Zool. Est. de Sao Paulo] II: 215-250, ill. **Kohls, G. M.**—Siphonaptera. A study of the species infesting wild hares and rabbits of North America north of Mexico. [Nat. Inst. Health] Bull. 175: 34 pp., ill. **Sanderson, M. W.**—A bat flea new to Arkansas. [103] 14: 60. The order Embioptera new to Arkansas. [103] 14: 60. **Setty, L. R.**—Description of the larva of Bittacus apicalis and a key to bittacid larvae. [103] 14: 64-65. **Truxal & Jenkins.**—An Ascalaphid larva note. [103] 14: 71. **Viets, D.**—A biological note on the Mantispidae [103] 14: 70-71.

**ORTHOPTERA.—Hebard, M.**—A new species of Pterophylla from eastern Mexico (Tettigoniid.). [Notulae Nat.] No. 81: 4 pp., ill. **Matthey, R.**—Etude biologique et cytologique de Saga pedo (Tettigoniid.). [Rev. Suisse Zool.

48: 91-142, ill. **Smith, C. W.**—Successful hibernation of the earwig parasite Bigonicheta setipennis in Ontario. [75th Ann. Rep. Ent. Soc. Ontario] 1940: 29-32. **Tinkham, E. R.**—Biological and faunistic notes on the Cicadidae of the Big Bend Region of Trans-Pecos, Texas. [6] 49: 165-182, ill.

**HEMIPTERA.—Beard, R. L.**—The biology of Anasa tristis, with particular reference to the tachinid parasite, Trichopoda pennipes. [Conn. Agric. Exp. Sta.] Bull. 440: 597-679, ill. **Drake, C. J.**—New American Tingitidae. [91] 31: 141-145. **Gomez-Menor Ortega, J.**—Cóccidos de la República Dominicana (Cocc.) [EOS] 16: 125-143, ill. **Hungerford, H. B.**—New distributional note on Notonecta borealis. [103] 14: 53. **Kuitert, L.**—An interesting abnormality in Ranatra quadrilentata. [103] 14: 71. **Monte, O.**—Catálogo dos Tingitídeos do Brasil [Arq. Zool. Est. de Sao Paulo] II: 65-174.

**LEPIDOPTERA.—Bell, E. L.**—Two new subspecies of Phlebodes tiberius. [6] 49: 193-197. **Bovey, P.**—Contribution à l'étude génétique et biogéographique de Zygaena ephialtes. [Rev. Suisse Zool.] 48: 1-90, ill. **Carpenter, G. D. H.**—An interesting sidelight on the causes of coloration in butterflies. [31] 147: 356. **Clark, A. H.**—Butterflies of Virginia. [Explor. & Field-Work Smiths. Inst. 1940] Publ. 3631: 57-60, ill. **Dethier, V. G.**—The immature stages of Rivula propiqualis. [119] 25: 450-453, ill. **Ferreira d'Almeida, R.**—Algumas observações sôbre a fauna de Lepidópteros da América. [Arq. Zool. Est. de Sao Paulo] II: 299-318, ill. Uma nova subespecie de Iphiclides telesilaus. [Arq. Zool. Est. de Sao Paulo] II: 319-320, ill. Contribuição para o conhecimento da biologia do Phyciodes hermas. (Nymphalidid.). [Arq. Zool. Est. de Sao Paulo] II: 321-324, ill. **Field, W. D.**—Additional notes on Calycopis cecrops and Calycopis beon (Lycaenidae). [103] 14: 66-69. **Filho, J. O.**—Sôbre a nomenclatura dos Lepidópteros da família Adelocephalidae. [Arq. Zool. Est. de Sao Paulo] II: 325-339. Euchromiidae de Salobra. [Arq. Zool. Est. de Sao Paulo] II: 261-280, ill. Contribuição à zoogeografia dos Euchromiidae Brasileiros. [Arq. Zool. Est. de Sao Paulo] II: 281-297, ill. **Hayward, K. J.** La "lagarta rosada" del algodonero (Pectinophora gossypiella). [Est. Exp. Agric. Tucuman] Circ. No. 93: 9 pp., ill. **Kuhn & von Engelhardt.**—See under Anatomy. **de**

**Martin, M.**—La colección de Lepidópteros del Museo. [Bol. Mus. Hist. Nat. "Javier Prado] 5: 46-61, cont. **McDunnough, J.**—On the characters of two genera closely allied to Eupithecia (Geometrid.). [4] 73: 62-63. (k). New species of moths, mostly Californian. [4] 73: 66-76. **Schaus, W.**—New species of heterocerous moths in the United States National Museum. [50] 89: 497-511. (S). **Schweizer & Webster Kay.**—Lepidopteros del Uruguay. [An. Mus. Hist. Nat. Montevideo] 5: 3-14, ill. (*). **Stallings, D. B.**—A note on Strymon alcestis. (Lycaenidae). [103] 14: 63. Aberrations found in Kansas. [103] 14: 72. **Watson, H. F.**—Wings to unfurl. [Jr. Nat. Hist. Mag.] 1941: 11-14, ill.

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**HYMENOPTERA.—Bugbee, R. E.**—Host relations and geographic distribution of new species of the genus Eurytoma from Mexico. [103] 14: 54-57. **Chisolm, J. J.**—A tiny army fights the Japanese beetle. [Nat. Hist.] 47: 268-271, ill. **Cockerell, T. D. A.**—Some tertiary insects from Colorado. [Amer. Jour. Sci.] 239: 354-356, ill. **Dowden, P. B.**—**Parasites** of the birch leaf-mining sawfly (Phyllotoma nemorata). [U. S. Dept. Agric.] Tech Bull. 757: 56 pp., ill. **Haskins, C. P.**—Note on the method of colony foundation of the ponerine ant Bothroponera soror. [6] 49: 211-216. **Henderson, C. F.**—Apparatus and technique for the study of the egg parasites of the beet leafhopper. [U. S. Dept. Agric.] Circ. 593: 18 pp., ill. **Lafleur, L. J.**—Communal disaffection in ants. [6] 49: 199-204. **Mari, J. G.**—Monografia de los Cerceris de Espana. (Spheg.). [EOS] 15 (1939): 7-93, ill. **Moure, P. J.**—Apoidea neotrópica. [Arq. Zool. Est. de Sao Paulo] II: 39-64, ill. (*). **Popov, V. B.**—Family Oxaeidae and processes of morphological reduction in bees. [Comptes Rendus, Acad. Sci., U. S. S. R.] 30: 82-85, ill. **Sjögren, S. J.**—Das anpassungsvermögen des bienenstaates. [Lunds Univ. Arssk.] 36: No. 7: 15 pp., ill. **Timberlake, P. H.**—Ten new species of Stelis from California. [6] 49: 123-137.

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THE FRANCIS WALKER TYPES OF TRICHOPTERA IN THE BRITISH MUSEUM, by CORNELIUS BETTEN and MARTIN E. MOSELY. British Museum, London. June 8, 1940, Price 15 shillings. ix and 248 pp., 122 figs.—In 1852 Walker described 101 species of Trichoptera, 71 from North America, the remainder from other scattered parts of the world. The species from North America have been a source of dispute and confusion since the time of their description and one of the gravest stumbling-blocks to students of the Trichoptera. The book of Betten and Mosely dealing with these is a fine piece of work

which redescribes Walker's types to bring out every valuable taxonomic character used in present day studies. The aim of the book was to settle the many problems which have arisen in regard to the identity of these species and the two authors have succeeded brilliantly. It is now one of the basic papers which is indispensable to the study of North American caddis flies. Every specimen recorded by Walker is studied and an interpretation given on opinions published in the past by various authors. Definite types are designated for Walker's species and from the remainder of the material six new species and one new variety are described. Two new genera are erected, *Trentonius* and *Frencsia*. The drawings by D. E. Kimmins are ample, clear, and in fine scale. There is no doubt but that this book lays a foundation for a much more stable group of names in caddis fly literature. Both the authors and the Trustees of the British Museum deserve a vote of thanks for the planning, execution, and publication of this book.—HERBERT H. ROSS.

## OBITUARY

Dr. LEVI W. MENGEL, founder and director emeritus of the Reading, Pennsylvania, Public Museum and Art Gallery and internationally known entomologist, died in Reading Hospital on the afternoon of February 3, 1941.

He would have been 73 years old on September 27. He was stricken by a heart attack while working in the Reading Museum on the previous afternoon. Alone, save for one or two members of the janitorial staff, he telephoned his physician, telling him he had an attack of indigestion. The doctor found Mengel sitting in his accustomed chair in the Museum office, suffering from a coronary occlusion, treated him and drove him to the Reading Hospital where, on the following afternoon, Dr. Mengel fell asleep and never awoke.

Dr. Levi Walter Scott Mengel, a son of the late Mathias and Amelia M. (Soder) Mengel, was born in Reading on September 27, 1858. After his graduation from Reading High School he entered the Philadelphia College of Pharmacy, taking his degree in 1891. In 1930, he received an honorary doctor of

science degree from Bucknell University. Albright College, Reading, gave him an honorary doctor of laws degree in 1934. In 1891, he, with other members of the Academy of Natural Sciences of Philadelphia joined Lieutenant (later Rear Admiral) Peary's expedition to West Greenland, he as the expedition's entomologist. Returning to Reading, he was employed by the Reading School District as a teacher, was a vice principal from 1902 to 1915, director of the Reading Museum and Art Gallery from 1915 to 1939 and director emeritus until his death.

In 1932 he spent some time in Czechoslovakia with the late Dr. Adelbert Seitz, the well-known lepidopterist, and on a number of occasions exchanged butterflies with the Grand Duke Nicholas Michaelovitch Romanoff. He was a collector of birds, minerals, stamps, postcards and butterflies; the last named collection, valued at $250,000, he gave to the Reading Museum. It includes one of the best collections of Erycinidae in the world, that of the British Museum being perhaps more extensive; it is also rich in Nymphalidae and Papilionidae.

In 1892 he published, jointly with the late Dr. Henry Skinner, a paper on Greenland Lepidoptera (Proc. Acad. Nat. Sci. Phila. 1892, pp. 156-159). It is based on the specimens captured by himself and Dr. Wm. E. Hughes, ornithologist of the Peary Expedition. Twelve species are represented: 2 Pierids, 1 Lycaenid, 1 Nymphalid, 1 Bombycid, 4 Noctuids and 3 Geometrids. Two of them were described as new. *Glaucopteryx immaculata,* a geometer, and a Pierid butterfly, *Colias hecla,* new variety *pallida.* The latter and some of the others were figured in ENTOMOLOGICAL NEWS (vol. III, p. 49, pl. ii, March, 1892).

In 1905 appeared *A Catalogue of the Erycinidae, A Family of Butterflies* with the synonomy [sic] brought down to July 1, 1904. By Levi W. Mengel, Prof, Natural History, Boys' High School, Reading, Pa., May, 1905. The above is the printed title, but in the copy which the author presented to Dr. Henry Skinner, under date of June 10.05, "July" has been crossed out and "Oct." written in its place. The preface begins as

follows: "To Whom it may concern: This catalogue is the result of some years of study of the family of which the author makes a specialty. It was made as a working catalogue for the author's guidance. That it is not without fault is known even to the writer; while he expects criticism, it is to be remembered that the sequence of genera, etc., is as the author thinks it ought to be with our present knowledge of the family. The writer uses 'Erycinidae' as the family name; for while the name is preoccupied, yet working naturalists over the world are less familiar with 'Lemoniidae' of Kirby, or with the still newer 'Riodinidae' of Grote."

The Catalogue comprises 161 pages, with, in most pages, two columns to the page. A brief notice of it was published by Dr. Skinner (unsigned) in the NEWS for June, 1905, page 200, in which it is stated that Prof Mengel published it at his own expense. Mr. R. C. Williams, Jr., tells us that Mengel told him that the sales were sufficient to take care of the cost of publication and comments: "a rare thing for a privately printed paper in Entomology." A notice of the *Catalogue* appeared also in the *Canadian Entomologist* for July, 1905, page 267, but it was not entered in the *Zoological Record* until 1907.

Dr. Mengel was a member of the American Association for the Advancement of Science, a member and a Research Associate of the Academy of Natural Sciences of Philadelphia and a corresponding member of The American Entomological Society. He was one of the most widely known and universally respected men in Berks County and one of the first advocates in America of visual education. This he made one of the functions of the Reading Museum, of which museum he said that it was no rich man's luxury but an important adjunct to Berks County's educational institutions. His interest in the Museum has been more fully touched on by Lawrence S. Dillon in *Science* for March 14, 1941, and by the local newspapers, such as the *Reading Times* for February 4, 1941.

FRIENDS OF L. W. M.

# ENTOMOLOGICAL NEWS

VOL. LII JULY 1941 No 7.

## The Hibernation in Missouri of Zerene caesonia (Stoll) and Euptoieta claudia (Cram.) (Lepid.: Pieridae and Nymphalidae).

By HAROLD I. O'BYRNE, 663 W. Lockwood Ave.,
Webster Groves, Missouri.

Our knowledge of the winter status of many of our familiar butterflies is far from complete. This is especially true of a number of species of southern distribution which are known to remain on the wing during the winter months in the South, but whose winter habits in the northern parts of their ranges are shrouded in mystery. Missouri is a border state with respect to these species, and for that reason, data on their hibernation in Missouri should have special significance. The Missouri species that deserve study in this connection are *Phoebis sennae eubule* (Linn.), *Zerene caesonia* (Stoll), *Eurema nicippe* (Cram.), *E. lisa* (Bdv. & Lec.), *Danaus plexippus* (Linn.), *Euptoieta claudia* (Cram.), *Precis coenia* (Hbn.), and *Anaea andria* Scud. Of these, only *Anaea andria* has heretofore been definitely known to hibernate in the imagine stage. The following records refer to *Zerene caesonia* and *Euptoieta claudia*.

Autumn individuals of *Zerene caesonia* are of the form *rosa* McNeill, characterized by the more or less extensive pink suffusion on the lower surface of the wings, especially in the females. In contrast, butterflies of the summer brood are plain yellow below, with no suggestion of pink. Butterflies captured in the spring, therefore, show by this character whether they belong to the brood that ordinarily emerges in the fall or the one that emerges in early summer. The forms and dates of the specimens in my collection are:

Form *rosa*: Mar. 6*; Apr. (no date)*; May 1.
Form *caesonia*: May 22, 25; June 11, 12, 16.
Form *rosa*: Sept. 11*, 15, 22; Oct. 23.

Specimens starred (*) represent the form of *rosa* known as *rosea* Roeber and belong to the autumn brood.

The earliest three spring specimens show the coloration of the brood which emerges in the fall; however, this is only circumstantial evidence that they actually emerged in the autumn preceding their capture. But the one caught on March 6 (1932) was found actually hibernating, under a small log on the east slope of a narrow valley. The butterfly was lying on its side, dormant, and was clinging with its legs to debris on the ground. This observation was made shortly before 11 a. m., when the temperature was 27° F., at Ranken (4 miles east of Eureka, St. Louis County), Missouri.

Less conclusive is the evidence for hibernation in *Euptoieta claudia*. This species is supposedly triple-brooded, but I find no break in its flying period during the summer, though the autumn brood is well set off. I have specimens taken on the following dates:

Summer brood: June 23.

Autumn brood: Sept. 21; Oct. 26; Nov. 1, 9.

Representative additional dates of its occurrence, taken from my records, are:

Summer broods: May 25; June 3, 14, 27; July 5, 12, 26; Aug. 10.

Autumn brood: Sept. 20, 22; Oct. 2, 11, 29.

Possible hibernators: May 13.

At Ranken, May 13, 1932, I saw a badly worn and faded female, and later on the same day a male just as worn, flying about on a sheltered, sunny hillside. The early date (for this species) and the evident worn condition of the butterflies, suggested strongly that they had hibernated. In view of the complete absence of records of possible hibernators in other years, it may be that 1932 was an exceptionally favorable year and that hibernation in Missouri takes place only under such favorable conditions. Scudder (Everyday Butterflies, 1899, p. 358) says, "It seems probable that the butterfly often hibernates, and that some of the autumn chrysalids do not disclose their inmates until very early the following spring"; but

Scudder worked in a locality considerably farther north than Missouri. My experience has been that all that have pupated emerge in the fall, but there are insufficient data to indicate whether the usual overwintering stage is the larva or the adult. French (Butterflies of the Eastern U. S., 4th ed., 1914, p. 167) says that the last brood probably hibernates in the larval state. A need for further observation is apparent.

## On Lerodea telata Herrich-Schaeffer and tyrtaeus Ploetz (Lepidoptera: Hesperiidae).

By E. L. Bell, Flushing, New York.

There seems to have been more or less confusion in the application of the names *telata* and *tyrtaeus*, the latter usually having been considered as a form of or a synonym of the former. An examination of the male genitalia shows that the insects to which these names should be applied are really specifically distinct.

Lerodea telata Herrich-Schaeffer (Fig. 1).

1869. *Cobalus telata* Herrich-Schaeffer, Correspondenzblatt des Zoologisch-Mineralogischen Vereines zu Regensburg, xxiii, p. 201.

1883. *Hesperia telata* Ploetz, Stettiner Entomologische Zeitung, xliv, p. 51; *apellus* Kaden, i. 1. Laguayra.

Herrich-Schaeffer did not mention the locality whence came his type material. The original description distinctly says that the spots of the forewings are yellow and Ploetz also says that they are of that color. Specimens before the writer from localities in Venezuela, Trinidad, British West Indies and Brasil have yellow spots on the primaries and these are considered to be the true *telata of* Herrich-Schaeffer.

Examination of the male genitalia of four specimens from the countries above mentioned shows the same form in all of them. In the figure here given of a specimen from Venezuela it will be seen that the claspers terminate in a short triangular apex, immediately back of which rises a stout dorsal tooth extending obliquely backward.

1 2

Male genitalia of 1. *Lerodea telata* Herrich-Schaffer, 2. *L. tyrtaeus* Ploetz.

LERODEA TYRTAEUS Ploetz (Fig. 2).

1883. *Hesperia tyrtaeus* Ploetz, Stettiner Entomologische Zeitung, xliv, p. 51. Laguayra.

1900. *Megistias telata* Godman, (not Herrich-Schaeffer), Biologia Centrali-Americana, Rhopalocera, ii, p. 574; pl. 101, figs. 13, 14, 15 male genitalia. Mexico; Honduras; Venezuela; Guiana.

1907. *Hesperia tyrtaeus* Godman, Annals and Magazine of Natural History, (7) xx, p. 143, "*Megistias telata* H.-S.-var."

1909. *Callimormus elides* Weeks, Entomological News, xx, p. 263, Suapure, Venezuela.

1911. *Callimormus elides* Weeks, Illustrations of Diurnal Lepidoptera, ii, p. 29; pl. xxi, fig. 1.

1924. *Megistias telata* Draudt, (not Herrich-Schaeffer), in Seitz Macrolepidoptera of the World, v, p. 974; pl. 187i.

In his paper on the genus *Hesperia* Ploetz describes *tyrtaeus* immediately following his diagnosis of *telata* Herrich-Schaeffer, and states that the spots on the primaries of *tyrtaeus* are white, thus distinguishing that insect from *telata* with yellow spots. Godman (1900) states that the insect he determined as *telata* had white spots, which he shows in his figure. He also figures the male genitalia of a Mexican specimen, this figure differing in the termination of the claspers from the form found in *telata*.

A female specimen from Ruatan Island, Honduras, in the collection of the American Museum of Natural History and a series of male specimens in the collection of the National Museum from Mexico; Guatemala; Costa Rica and Taboga Island, Panama, have small, dirty white spots on the primaries and these are believed to be *tyrtaeus*.

These specimens superficially agree with the Godman figures and the form of the genitalia from four specimens, kindly dis-

sected by Mr. W. D. Field, agrees in detail with the Godman figure.

In the accompanying figure of the genitalia of *tyrtaeus* it will be seen that the claspers terminate in a long, narrow, sharply pointed apex, far back of which rises a short triangular tooth.

*Tyrtaeus* usually has the spots of the discal band of the primaries much smaller than those found in *telata* and often some of them are very indistinct or entirely lacking, but other than this and the whitish color of the spots there is considerable resemblance between the two species, especially on the under side of the secondaries where the color and pattern is very much the same, although variable in both species.

The Ploetz type of *tyrtaeus* was said to have come from Laguayra and in this region may possibly fly with *telata* but in Mexico and the Central American region it appears to be the prevailing species.

## The Genus Colias in North America (Lepidoptera: Pieridae).

By Austin H. Clark, U. S. National Museum, Washington, D. C.

In the study of butterflies too much attention has been concentrated on the description and study of type or typical specimens and too little on the description of species as a whole. Yet it is quite as important to understand a species as a unit as it is to view it as an aggregation of subspecies, forms, and aberrations.

The following description of the common local *Colias* is based upon a very large number of specimens, all from the District of Columbia. They were collected by Mr. Warren Herbert Wagner, Jr., who has been so kind as to permit me to study them in detail. He later presented them to the U. S. National Museum.

Regarding this description the objection may be raised that the specimens represent the local *philodice*, the recent immigrant *eurytheme*, and hybrids between them. But since *philodice* is only the northeastern form of *eurytheme* and hybridization occurs at all points where the ranges of these two forms overlap the picture presented by these specimens is a perfectly natural one so far as this species is concerned.

The fore wings in the males vary from 18 to 32 mm. in length, and in the females from 18 to 33 mm. Dwarfs are most common in early spring, though they occur at all seasons. Giants are found only in the last half of the summer, in low and more or less damp meadows.

The shape of the fore wings is very varied. They may be short and broad with the outer edge at right angles to the lower edge and the outer edge rather strongly convex, or longer with the angle between the outer and lower borders obtuse, the outer border straight, and the apex pointed. In early spring or winter individuals they may be markedly elongated and narrow. The extreme type of short wing and the extreme type of long wing occur most frequently in very small individuals and are rare in individuals above medium size. The pointed wing with the straight outer border is characteristic of all very large individuals, but occurs typically developed also among the smallest. The lower border of the fore wings is straight in the females, in the males either straight or bowed outward forming a very broadly rounded obtuse angle approximately in the center. There is no difference in wing shape between yellow and orange individuals, but the majority of the yellow individuals have the outer border of the fore wings more or less convex and the lower border straight, while most of the orange ones, particularly the larger, have the outer border straight and the lower bowed outward. However, many yellow individuals, especially the larger ones, have the same wing shape as orange individuals of the same size. There is little difference between males and females in the shape of the fore wings, though in the females they are never so pointed as in the more extreme males, and the lower border is always straight.

The hind wings vary from evenly rounded with scarcely any trace of an anal angle to subangulate with a sharply rounded anal angle, almost a right angle, and another sharply rounded angle at the end of vein 6. They are usually broad, the maximum width in the females and in many males being 88 percent of the length. In the larger males with strongly angulated

wings the width is 80 percent of the length. In long-winged early spring or winter individuals the maximum width is only 70 percent of the length.

The color varies from a light clear citron yellow, sometimes more or less greenish, to a uniform brilliant orange, the males with more or less intense violet reflections, usually with the costal margin yellow, and in the females with the spots included in the dark borders yellow. But the costal margin in both sexes and the included spots in the dark borders of the females are occasionally orange like the rest of the wing. Rarely the males are chrome yellow or uniform light dull orange.

In the transition from the yellow to the deep orange forms the orange first appears as a faint flush on the under side of the fore wings in the inner portion. The next stage is an orange flush between the lower edge and vein 1 of the fore wing. From this the orange flush spreads upward to the cell. Individuals are common that have the fore wings suffused with orange in a roughly triangular patch extending from the wing base outward to a line from the end of the cell to the lower end of the dark margin, the upper and outer sides of this orange triangle gradually shading into the yellow of the rest of the wing. More rarely this orange patch has sharply defined borders, or the veins anterior to the orange patch are broadly bordered with orange, the borders being broadest at the base and tapering outwardly. Next the orange suffusion appears on the hind wings, but here it becomes evident uniformly over the entire wing except anterior to vein 7 and below vein 1, these areas always remaining yellow. As the orange spreads over the wings it usually deepens in color, though this is not always true. Uniform pale orange, chrome yellow, or dull orange individuals occur, flying with the much more numerous bright orange and clear yellow ones.

(To be continued.)

## OBITUARY

*Science* for June 13, 1941, announced the death of Dr. LEE ABRAM STRONG, chief of the Bureau of Entomology and Plant Quarantine, on June 2. He was born at Russell, Iowa, June 17, 1886, was engaged in horticultural inspection and plant quarantine in California 1910-18, 1919-29, and in the Federal service from 1929 on, becoming chief of the Bureau above mentioned in July, 1934.

## The Leng Types of Cicindelidae (Coleoptera).

By RICHARD G. DAHL, Oakland, California.

(Continued from page 172.)

10. C. BELLISSIMA Leng. Leng, C. W., 1902, Cic. of Bor. Amer.; Trans. Amer. Ent. Soc. XXVIII, p. 142.

*Lectotype Locality:* Yaquina Bay, Oregon. *Collector:* Wickham.

*Discussion:* Lectotype male designated from a series of ten specimens all from Oregon (C. W. Leng collection). In the designated lectotype the color is coppery green above and dark green below; the impressions of the thorax and elytra are metallic green; the markings are uniformly widened. In the cotype series there is little variation, except in color, which varies from cupreous to greenish-bronze.

11. C. LONGILABRIS var. NOVATERRAE Leng. Leng, C. W., 1918, Journ. N. Y. Ent. Soc. Vol. XXVI, Nos. 3-4, p. 140.

*Type Locality:* Bay St. George, Newfoundland. *Date:* July. *Collector:* W. S. Genung.

*Discussion:* Type designated by C. W. Leng in 1918 from four specimens, represented by a type (female) and three paratypes. In the type the markings are narrow, and the subapical spot does not extend to the margin. The color is brilliant green with bronze reflections. This form is a synonym of *Cicindela longilabris* subsp. *laurenti* Schp.

12. C. LONGILABRIS var. VESTALIA Leng. Leng, C. W., 1902, Cic. of Bor. Amer.; Trans. Amer. Ent. Soc. XXVIII, p. 121.

*Lectotype Locality:* Maiden, Montana. *Date:* June 17, 1890. *Collector:* From the collection of Fred C. Bowditch.

*Discussion:* Lectotype female designated from a cotype series of three. Additional cotype specimens are from Fort McLeod, British America, 1882, and Telegraph Creek, British America, all from the C. W. Leng collection. In the designated lectotype, the color is bright coppery bronze above and dark metallic green below. In the cotype series there is little variation except in color, which varies from coppery-bronze to dark

green. This form is a synonym of *Cicindela longilabris* Say.

13. C. LONGILABRIS var. OSLARI Leng. Leng, C. W., 1902, Cic. of Bor. Amer.; Trans. Amer. Ent. Soc. XXVIII, p. 121.

*Lectotype Locality:* Southwest slope of Mount Wilson, 12,000 feet, San Miguel Range, Colorado. *Date*: July 18 to 27. *Collector:* Ernest J. Oslar.

*Discussion:* Lectotype female designated from a cotype series of nine. Additional cotype specimens are from Colorado and Savoy, South Dakota, 5,000 feet, June 11, all from the C. W. Leng collection. In the designated lectotype the color is brilliant green throughout, with no humeral marking, but with a post-humeral spot, otherwise narrow markings. In the cotype series before me, six have humeral spots, one is without post-humeral spots; otherwise the markings vary only in their widths, and in that very little. The color in the cotype series varies from coppery-bronze to bright green. This form is a synonym of *Cicindela longilabris laurenti* Schp.

14. C. OREGONA var. MARICOPA Leng. Leng, C. W., 1902, Cic. of Bor. Amer.; Trans. Amer. Ent. Soc. XXVIII, p. 150.

*Lectotype Locality:* Phoenix, Arizona.

*Discussion:* Lectotype male designated from a cotype series of six. Additional cotype specimens are labeled "Prescott, Arizona, May 13", and "Arizona", all from the C. W. Leng collection. In the designated lectotype the head and the pronotum are a shining metallic green; the elytra are a dull dark violet, and the underparts are a shining dark violet. In the cotype series there is little variation, except in size, which varies the same as in *oregona Lec.* The markings are generally heavier than *oregona* Lec.

There is sufficient evidence to prove that this form should be known as *Cicindela oregona* subspecies *maricopa*. It is restricted to the southern arid regions of the Great Basin. In the M. A. Cazier collection there is a specimen from Zion Cañon, Utah, of which the elytra are a dull dark green and the pronotum a dull green. A specimen from Barstow, Cali-

fornia, July, 1914, (R. T. Garnett collection) is typical of *maricopa*. In a series of *maricopa* from Prescott, Arizona, June, 1909 (H. Kushner), three stand out as different, varying in being entirely black above, and the thorax beneath dark violet and the abdomen dark green. Another specimen from White Mountains, Arizona, June, (D. K. Duncan collector) has heavy markings, a dark green elytra and a cupreous pronotum. It is intermediate between *maricopa* and *guttifera* Lec.

15. C. SEXGUTTATA var. HARRISI Leng. Leng, C. W., 1902, Cic. of Bor. Amer.; Trans. Amer. Ent. Soc. XXVIII, p. 128.

*Lectotype Locality:* Lake Memphremagog, Canada.

*Discussion:* Lectotype male designated from a series of four cotypes. Other cotype specimens are from De Bruce, New York; Stamford, New York, August and North Carolina, all from the C. W. Leng collection. This variety can be distinguished from typical *sexguttata* Fab., by the absence of the strong bluish or greenish reflections. It is a mountain form, being taken at high elevations throughout north-eastern United States.

16. C. ROBUSTA Leng. Leng, C. W., 1902, Cic. of Bor. Amer.; Trans. Amer. Ent. Soc. XXVIII, p. 124.

*Lectotype Locality:* Alpine, Texas. *Date:* July 20-22. *Elevation:* 4,400-6,000 feet. *Collector:* Wickham.

*Discussion:* Lectotype female designated from two cotype specimens, both from the C. W. Leng collection. The other cotype is from Marfa, Texas, June 15. In the designated lectotype the anterior parts of the elytra are more coarsely punctate than in that of *nigrocoerulea* Lec., and is a dark green in color. Neither of the cotypes have markings, as illustrated by W. Horn[1].

17. C. BOWDITCHI Leng. Leng, C. W., 1902, Cic. of Bor. Amer. Trans. Amer. Ent. Soc. XXVIII, p. 124.

*Lectotype Locality:* Vicinity of Durango, La Plata County, Colorado. *Date:* July 23-August 8, 1885. *Collector:* Fred

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[1] Horn, Walther, 2,000 Zeichnungen von Cicindelinae, Band 5, März 28, 1938, p. 76.

C. Bowditch. *Lectotype Now Located:* Museum of Comparative Zoology, Harvard College, Cambridge, Massachusetts.

*Discussion:* Two specimens were mentioned by Leng[2], both as occurring in the vicinity of Durango, Colorado.

Mr. M. A. Cazier, who has seen this specimen at Cambridge, has assured me that it agrees in every way with the description. This designated lectotype is entered as a cotype in the Museum of Comparative Zoology type catalog under number 16,272. This form is at present considered to be the maculated variety of *nigrocoerulea* Lec.

18. C. CARTHAGENA HENTZIANA Leng. Leng, C. W., 1918, Journ. N. Y. Ent. Soc., Vol. XXVI, Nos. 3-4, p. 139.

*Discussion:* This name was proposed by C. W. Leng in place of *Cicindela carthagena hentzi* Geo. H. Horn which was previously occupied by *Cicindela carthagena hentzi* Dej. The type of this is in the George H. Horn collection at the Philadelphia Academy of Natural Sciences.

19. C. PUSILLA var. TUOLUMNAE Leng. Leng, C. W., 1902, Cic. of Bor. Amer.; Trans. Amer. Ent. Soc., XXVIII, p. 157.

*Lectotype Locality:* Hetch Hetchy Valley, Tuolumne County, California. *Collector:* Dr. Edwin C. Van Dyke.

*Discussion:* Lectotype female designated from the unique specimen in the C. W. Leng collection. This is at present considered to be an aberrant form of *Cicindela pusilla lunalonga* Schp.

20. C. KNAUSII Leng. Leng, C. W., Cic. of Bor. Amer.; Trans. Amer. Ent. Soc., XXVIII, p. 166.

*Discussion:* There are no specimens of this in the C. W. Leng collection that agree with his descriptions well enough to be designated as a lectotype. This is at present recognized as a variety of *nevadica* Lec.

I have been unable to locate either types or cotype material of *Omus intermedius* Leng, *Cicindela tranquebarica minor* Leng, and *Cicindela knausii* Leng. There is no material in the C. W. Leng collection that agrees with his descriptions of these. It is unfortunate that this type material became separated from the C. W. Leng collection of Cicindelidae.

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[2] Leng, C. W., 1902, Cic. of Bor. Amer; Trans. Amer. Ent. Soc. XXVIII, p. 124.

# Undescribed Species of Crane-flies from the Eastern United States and Canada (Dipt.: Tipulidae). Part VII.

By CHARLES P. ALEXANDER, Massachusetts State College, Amherst, Massachusetts.

The Tipulidae discussed herewith have been received from various sources that are indicated in connection with each species. The preceding part under this general title was published in ENTOMOLOGICAL NEWS, vol. 51: 83-85, 99-103; 1940.

**Dolichopeza (Oropeza) pratti** n. sp.

Belongs to the *obscura* group; general coloration of mesonotum opaque brown, without clearly defined stripes; legs dark; wings with a brownish tinge. the oval stigma a little darker brown; vein $Sc_1$ preserved; abdominal segments bicolored; male hypopygium with median area of tergite narrowly produced into a tridentate lobe; lateral tergal arms appearing as narrow spatulate blades; outer dististyle a little dilated on basal portion, the apex a short spinous point; inner dististyle deep, its rostral prolongation long; aedeagus simple, unarmed.

♂. Length about 8-9 mm.; wing 10-10.5 mm.; antenna about 2.8 mm.

Frontal prolongation of head brownish black; palpi dark brown. Antennae with scape brownish yellow; pedicel light yellow; flagellum black; verticils of flagellar segments coarse. Head dark gray.

Mesonotum brown, the surface of praescutum opaque, the posterior sclerites more nitidous; in some cases, praescutum with faint indications of lighter stripes. Pleura paler brown. Halteres dusky.

Legs with the coxae pale brown; trochanters obscure yellow; remainder of legs brown, including the tarsi.

Wings with a brownish tinge, the oval stigma a little darker brown; prearcular field a very little brightened; veins brown. Venation: $Sc_1$ preserved, $Sc_2$ ending opposite or just beyond the origin of *Rs;* petiole of cell $M_1$ exceeding *m*.

Abdominal tergites obscure brownish yellow to testaceous yellow, the lateral margins and incisures darkened, on the outer segments and hypopygium the dark color including all of the segments; basal sternites yellow, the incisures narrowly darkened, the outer segments more generally suffused. Male hypopygium with the median area of tergite produced into a

narrow lobe, the apex of which is further toothed, usually tridentate, with the central point longest; lateral tergal arms with outer blades expanded into weak spatulae, in some cases these only a little wider than the arms. Outer dististyle a little dilated on basal portion, the apex a short spinous point. Inner dististyle with the blade deep, the rostrum long-produced, its apex weakly bidentate. Aedeagus simple, unarmed.

*Habitat.*—MINNESOTA. *Holotype:* ♂, St. Paul, September 14, 1940 (H. D. Pratt). *Paratopotypes,* 5 ♂ ♂. Types in author's collection.

I take great pleasure in naming this interesting crane-fly in honor of the collector, my former student, Dr. Harry Davis Pratt. From the other described species of the *obscura* group, the present fly is closest to *obscura* (Johnson), *tridenticulata* Alexander, and *polita* (Johnson), especially the last. The shape of the median tergal lobe is much the same in the two flies but the other details of structure of the hypopygium of *polita* are quite distinct, especially the more expanded lateral tergal arms, the bulbous basal enlargement of the long blackened outer dististyle, the tuft of longer setae on outer face of the inner dististyle, and the differently constructed gonapophyses with more abundant armature. All of these species differ further in the length and structure of the antennae.

**Limonia (Dicranomyia) broweriana** n. sp.

Allied to *magnicauda;* general coloration of thorax brownish yellow, the praescutum with a very conspicuous blackened median stripe; antennae black throughout; wings with a faint yellow tinge, the stigma only slightly indicated; male hypopygium very large and complicated in structure; ninth tergite subcordate in outline, the caudal margin truncate; both the basistyle and ventral dististyle greatly complicated by lobes and outgrowths.

♂. Length about 8 mm.; wing 7.4 mm. ♀. Length about 8 mm.; wing 7.5 mm.

Rostrum brownish black; palpi black. Antennae black throughout; flagellar segments oval, the outer segments a little more elongate; terminal segment (male) a trifle longer than the penultimate; verticils short. Head dark brown.

Pronotum brownish black medially, paler on sides. Mesonotal praescutum brownish yellow pollinose, with a very con-

spicuous blackened median stripe and inconspicuous brownish lateral areas, all of these in some cases more or less confluent on the posterior portion of sclerite; posterior sclerites of notum chiefly pale, the scutellum and median area of scutum faintly pruinose; scutal lobes weakly darkened. Pleura brownish yellow pollinose, the ventral sternopleurite a trifle darkened. Halteres relatively short, stem yellow, knob dark brown.

Legs with the coxae and trochanters yellow; remainder of legs dark brown, the femoral bases yellow.

Wings with a faint yellow tinge, the stigma only slightly differentiated; prearcular field clearer yellow; veins brown, flavous in the basal area. Venation: *Sc* variable in length, $Sc_1$ ending shortly before to just beyond the origin of *Rs*, $Sc_2$ slightly removed from its tip, $Sc_1$ alone subequal to *m-cu;* vein *2nd A* gently sinuous.

Abdominal tergites dark brown, the extreme caudal margins pale; sternites obscure brownish yellow to pale brown, with the pale caudal borders somewhat wider and more conspicuous. Male hypopygium very large and conspicuous, the most so of any of the described Nearctic species of the subgenus. Ninth tergite very large, subcordate in outline, narrowed behind, the length and greatest width subequal; caudal margin of tergite truncate, with numerous setae. Basistyle of moderate size, the ventromesal lobe large and very complicated by lobules and outgrowths, including one arm that is conspicuously but unequally bifid, the lower branch being only about one-half as long as the more clavate upper branch; besides this arm, the lobe is produced into an even larger and longer blade that gradually narrows to the pale obtuse apex. Dorsal dististyle a small, sickle-shaped rod. Ventral dististyle with the main body small and pale, the base and rostral prolongation more sclerotized and very complex; from base of style extends a long, gently curved blackened arm, the tip expanded and further produced at apex into a small digitiform lobule; rostral prolongation very complex, beyond the two subequal spines widened and bilobed, the upper lobe longer and terminating in a recurved spinous point; lower lobe broader and more obtuse. Gonapophyses with mesal-apical lobe small but slender, gently curved.

*Habitat.*—MAINE. *Holotype:* ♂, Richardson Lake, near Oquassoc, Oxford County, August 24, 1940 (A. E. Brower). *Allotopotype:* ♀.

This striking crane-fly is named in honor of Dr. A. E.

Brower, to whom I am very greatly indebted for many interesting Tipulidae from Maine and from interior Gaspé. The nearest ally is *Limonia* (*Dicranomyia*) *magnicauda* (Lundström) of northern Europe. While both species agree in the great size of the male hypopygium and in the general structures of the same, yet all details of the tergite and the various lobes of the basistyle and ventral dististyle are distinct in the two flies.

**Dicranoptycha tennessa** n. sp.

General coloration brownish gray, the praescutum with a slightly darker median stripe; antennae with scape brownish black; pleura light gray, the anepisternum and ventral sternopleurite darkened; legs obscure yellow, the femora with the tips rather narrowly infuscated; wings with costal fringe (male) unusually long and conspicuous; abdominal tergites brown, sternites yellow, a black subterminal ring; hypopygium yellow; male hypopygium with the outer dististyle unusually broad and flattened, terminating in a short blackened point; surface of style before apex weakly roughened; aedeagus unusually broad and flattened.

♂. Length about 9 mm.; wing 8.5 mm. ♀. Length about 10 mm.; wing 9.5 mm.

Rostrum black, sparsely pruinose; palpi black. Antennae with scape brownish black, pedicel brownish yellow, flagellum brownish black. Head gray, provided with long conspicuous black setae.

Pronotum brownish gray. Mesonotal praescutum brownish gray, with a more or less distinct, darker brown, median stripe, the lateral stripes less evident; posterior sclerites of notum grayish pruinose. Pleura light gray, more darkened on the anepisternum and ventral sternopleurite. Halteres relatively elongate, yellow.

Legs with the coxae testaceous yellow; trochanters yellow; femora obscure yellow, the tips rather narrowly but evidently infuscated, the amount subequal on all legs; tibiae and basitarsi obscure yellow; outer tarsal segments blackened.

Wings with a yellowish tinge; veins brown. Costal fringe of male unusually long and conspicuous. Venation: *Rs* relatively short, only about one-fifth longer than the basal section of $R_{4+5}$ and much shorter than cell *1st* $M_2$, the latter relatively small; *m-cu* nearly its own length beyond the fork of *M*.

Abdominal tergites brown; sternites yellow, the subterminal

segments black; hypopygium yellow. Male hypopygium with the tergal arms relatively short, expanded into broad blades, their apices obtuse. Outer dististyle unusually broad and flattened, terminating in a short blackened point; surface of style before apex weakly roughened; base of style with abundant short pale setulae. Inner dististyle relatively short, not or scarcely constricted before apex. Aedeagus unusually broad and flattened, more so than in *megaphallus* or *sobrina*.

*Habitat.*—TENNESSEE. *Holotype*: ♂, Knoxville, June 10, 1939 (Arthur C. Cole). *Allotopotype*, ♀, pinned with type.

This interesting fly was included in extensive series of Tipulidae from the Great Smoky Mountains, received from my friend, Dr. Arthur C. Cole, to whom I am greatly indebted for many favors. The species is allied to *Dicranoptycha sobrina* Osten Sacken and probably has been confused with this in collections. Both species have the costal fringe of the male long and very conspicuous. The present fly has the darkened apices of all femora subequal in amount and has a very different male hypopygium, with both the outer dististyle and aedeagus unusually broad and flattened.

## District of Columbia Butterfly Notes (Lepidoptera : Rhopalocera).

By WARREN HERBERT WAGNER, JR., Washington, D. C.

In "The Butterflies of the District of Columbia and Vicinity" (U. S. Nat. Mus. Bulletin 157), Mr. Austin H. Clark listed 92 species and subspecies from the area covered. Forty-five additional species were listed in an appendix as possibly occurring as very local residents or casuals.

Since the publication of this list 10 species have been added to the District fauna. Of these, 7 were given in the appendix, 2 were not mentioned in the appendix, and one (*Thorybes confusis*) had been earlier recorded from the District by Mr. E. L. Bell but the record had been overlooked by Mr. Clark. These ten species are: *Lycaena thoë* (Guerin), *Strymon liparops strigosa* Harris, *Eurema jucunda* Boisduval and LeConte,

*Papilio palamedes* Drury, *Erynnis zarucco* Lucas, *Thorybes confusis* Bell, *Hesperia metea* (Scudder), *Atrytone bimacula* Grote and Robinson, *Poanes aaroni* Skinner, *Lerodea eufala* (Edwards).

Of these 10 species Mr. Clark secured *Atrytone bimacula; Poanes aaroni* was recorded from a specimen taken many years ago by Mr. Eugene M. Aaron; *Thorybes confusis* was earlier recorded by Mr. Bell and has been taken both by Mr. Clark and myself; and I had the good fortune to secure the other seven.

In addition to these Mr. Clark has taken *Papilio philenor* f. *acauda* in nearby Maryland and *Lycaena phlaeas hypophlaeas* ab. *fulliolus* in nearby Virginia: Mr. Gilbert Yobst has taken *Vanessa virginiensis* ab. *ahwashtee* in the latter place and I have taken several specimens of *Phyciodes tharos* ab. *dyari* in Washington.

These additions to the District list, with the exception of the last two have been briefly noted by Mr. Clark. I have, however, some supplementary notes on these and other species in the District of Columbia area which seem to be worthy of publication. For helping me I should like to acknowledge the Washington naturalists for their assistance and Dr. R. G. Schmieder of the University of Pennsylvania for his suggestions. Most of all I am indebted to Mr. Clark for his patient assistance in every way and for contributing introductory material. The nomenclature used is that of McDunnough's 1938 Check List of the Lepidoptera of Canada and the United States with two exceptions.

SATYRODES EURYDICE (Johannsen). There is a partial second brood in the Washington area. Mr. Shoemaker found it here in September and I have seen it a few times at Hyattsville, Maryland, in late September and I have one taken September 19, 1936, along Difficult Run near Tyson's Corner, Fairfax County, Virginia.

MINOIS ALOPE (Fabricius). In Washington, those specimens without the lower eye-spot on the fore wings above, which are like the large southern subspecies *pegala,* are merely variants of f. *maritima.* However, those specimens that are found

along the Chesapeake Bay salt marshes in Maryland east of Washington are larger and much closer to typical *pegala*.

POLYGONIA INTERROGATIONIS (Fabricius). The winter form (*fabricii*) and the summer form (*umbrosa*) are occasionally found out of season. It is interesting to note that in 1935, Wayne K. Hill and I found a number of the summer form in early May and I took a badly worn one in Rock Creek Park, May 28. At the last place I took the winter form on July 21, 1935.

PRECIS COENIA (Hübner). The wet form appeared in 1933-34-35, late in the season in great numbers at MacMillan Park in Washington. The reddish underside varies from bluish to almost entirely dark brown in some individuals.

ASTEROCAMPA CLYTON (Boisduval and LeConte). Although they are sometimes found together, when alone *clyton* occurs in dry open places around hackberries and *celtis* flies usually in deep woods. In the Soldiers Home Grounds in Washington *clyton* occurs alone. The first brood lasts from the end of the second week in June until the first week in July. July 10, 1934, was an unusually late capture. The second brood starts the middle of August and flies until late September. Two chrysalids in my series are dated September 20, 1934. The color ranges from very light to very dark. On August 28, 1938, I watched an old male court a fresh female. It took him about thirty minutes to rout three other males. The female repulsed him by quick darts for fifteen minutes and then they suddenly mated. The female carries the male in flight. The ceremony took place around the bottom branches of a cherry tree about ten feet above the ground. *Clyton* is found also at Camp Letts, Fair Haven, and Fort Washington in Maryland.

PHYCIODES THAROS (Drury). Because of its great abundance aberrations are frequently found. Specimens with slightly fused markings are found in both broods and the markings come together in many different combinations. Melanism is frequent and the melanistic aberration *dyari* Gunder has been found several times in and near Washington. Males seem attracted to the females of this coloration as much as the females of normal markings.

ARGYNNIS APHRODITE Fabricius. Two males; a fresh one lacking the usual reddish tinge taken in Washington, June 8, 1938, and an old broken one from Beltsville, Maryland, on July 2, 1938; indicate that at least some males appear before the middle of June instead of the first of July.

VANESSA VIRGINIENSIS (Drury). A specimen of the aberration *ahwashtee* Fox was taken by Mr. Gilbert Yobst along Scotts Run, Fairfax County, Virginia, in May, 1936. The ground color of the hind wings underneath is snow white and all of the markings are slightly blurred.

LIBYTHEA BACHMANII Kirtland. The Snout Butterfly is more common in the region along Chesapeake Bay in Maryland to the east of Washington, but it varies tremendously in numbers. In 1932, it was exceedingly abundant at Camp Letts, near Beverley Beach, Maryland, but only of infrequent occurrence since. During 1933-34-35, chrysalid skins were found on hackberries in the Soldiers Home Grounds around the bottom branches near the trunks.

STRYMON FALACER (Godart). In certain very restricted localities this hairstreak is abundant for a limited period. Sunny glades in dry oak woods (often with much pine) form the playgrounds for the males. Beside chasing one another I have seen them pursue *Achalarus lyciades, Epargyreus tityrus* and *Thorybes* species. Males appear the first week in June and remain in their woods until after the middle of June when they start wandering out into the open fields. It was found at Widewater, Beltsville and Muikirk, in Maryland, and in the Soldiers Home, Catholic University Grounds and in woods east of 16th Street, N. W., near the District line. Some specimens found showed a decided breaking up of the band on the underside approaching *S. edwardsi.*

S. LIPAROPS STRIGOSA Harris. Only one has been found: this was a female taken June 10, 1935, on Aster flowers near the bog at Hyattsville, Maryland.

S. TITUS MOPSUS Hübner. This hairstreak is also more common than previously supposed. The Catholic University Grounds and the bog at Hyattsville, Maryland, are the locali-

ties where it is most common. The males select brushy knolls of dry grassy hills for their playgrounds and they are very pugnacious. Orange and Red Milkweeds are its favorite flowers. My earliest date is June 13, 1936, at Camp Letts, Maryland and it becomes rare after the middle of July. It is never found in the woods but rather in open country. Dwarfs are occasional in both sexes.

INCISALIA HENRICI (Grote and Robinson). This is one of our earliest appearing butterflies. I have a male taken March 30, 1935, at Cabin John, Maryland. It also occurs at Hyattsville, and near the Powdermill Bogs along Paint Branch, in Maryland and in woods west of 16th Street, N. W., near the District line.

FENISECA TARQUINIUS (Fabricius). On June 11, 1939, this butterfly was common on elms along Morningside Drive, N. W., in Washington. The elms were infested with aphids and I suspect that these were the food. Its usual haunt is along streams.

LYCAENA THOË (Guerin). In 1934, I took an old female in a dry field in the Soldiers Home Grounds on June 15 and a perfectly fresh male in the Beltsville, Maryland Bog on July 22. This extends the known range on the Eastern Seaboard considerably southward.

PHOEBIS SENNAE EUBELE (Linnaeus). Spring records are a female taken by Mr. Wayne K. Hill, May 11, 1935, at Cabin John, Maryland, and a male that I took in April, 1933, at Terra Cotta in the District. Both are somewhat old specimens. A female taken in August, 1939, at Camp Letts, Maryland, (where *eubele* is much more common) is very pale yellow showing an approach to f. *pallida*.

EUREMA NICIPPE (Cramer). A male taken March 21, 1938, in downtown Washington and a female taken April 27, 1935, at Cabin John, Maryland, are the only spring records for this area.

(To be continued.)

# Notes on Some Cuculliinae (Phalaenidae, Lepidoptera) I.

By J. G. FRANCLEMONT, Ithaca, New York.

## MNIOTYPE nom. nov.

*Genotype*: *Hadena ducta* Grote=*Mniotype ducta* (Grote).

This name is proposed to replace ‡*Crino* Hampson, Cat. Lep. Phal. B. M., vi, 321, 1906, nec ||*Crino* Hübner Samml. exot. Schmett., ii, plate (197), 1821 [nec *Crino* Lamarck *in* Virey, Journ. de Phys., iv, 429, 1798]. Hampson erred in that he credited the type of *Crino*, *sommeri*, to Lefebure. *Sommeri* Lef., a noctuid, was described in 1836, fifteen years after Hübner described his genus *Crino*, which included one species *sommeri* Hübner, a notodontid! Nevertheless Hübner's generic name *Crino* is preoccupied by *Crino* Lamarck, so *Tarsolepis* Butler will be, as it has been, used for *sommeri* Hbn. and its allies.

*Mniotype* will include all the species listed under *Crino* in McDunnough's Checklist, page 84, 1938, and the Eurasian species, *adusta* Esp., *satura* Schiff. and related forms.

## SERICAGLAEA gen. nov.

*Genotype*: *Orthosia signata* French=*Sericaglaea signata* (French).

Proboscis well developed; palpi short, porrect, clothed with scales and long hair, the third segment drooping, inconspicuous, hidden in the hair of the second; eyes moderate and rounded; antennal scape without lashes, antennae of male simple, minutely ciliate; thorax clothed with hair, no anterior or posterior crests; forelegs with the first tarsal segment bearing 6 to 7 moderately long slender spines, distinctly longer than those on succeeding segments of the same leg, the femora and tibiae of all legs fringed with long hair; abdomen very much flattened, fringed with very evident lateral and anal tufts, no dorsal tufts, clothed on the dorsum with scales and hair; fore wing with the costa evenly curved, the apex blunt and rounded.

Male genitalia symmetrical; uncus simple, long and curved; tegumen broad with two expanded basal lobes; vinculum

moderate, long; harpes with a distinct pollex and long curved clasper; corona slight; aedoeagus moderate, vesica with a long spine, which possesses a bulbous base, and with a large group of micro-chaetae.

This genus differs from *Epiglaea, Harpaglaea* and *Psectraglaea* by the absence of the conspicuous, sharp frontal tuft and from the latter two genera also by the lighter spination of the first fore tarsal segment. It differs from *Metaxaglaea*, in which I placed the sole species when describing that genus, first, by the palpi, which have the third segment drooping and hidden in the hair of the second, while *Metaxaglaea* has the third segment of the palpi visible and porrect; second, by the cut of the fore wings, those of *Metaxaglaea* having the apex distinctly more acute; third, in that the species of *Sericaglaea* hibernates as an adult, while the two species of *Metaxaglaea* oviposit in the fall, shortly after emerging. Since the author feels that a genus should, besides being structurally a unit, be fundamentally also a biological unit, he believes that this last difference is as valid as a difference of structure. The genitalia approach those of *Psectraglaea*, differing mainly in that the aforementioned genus entirely lacks a corona; from *Metaxaglaea*, they differ in the well developed clasper, the slight corona and the shorter and stockier harpes (valves).

Included species: *Sericaglaea signata* French.

PYREFERRA HESPERIDAGO (Guenée).

*Hoporina hesperidago* Guenée, Spec. Gen. Lep., vii (Noct. iii), 393, 1852.

*Xanthia indirecta* Walker, Cat. Lep. Het. B. M., x, 468, 1856 (New synonymy!)

*Scopelosoma graefiana* Grote, Bull. Buff. Soc. Nat. Sc., ii, 69, 1874.

*Scopelosoma moffatiana* Grote, Bull. U. S. Geol. & Geog. Surv., vi, 583, 1882.

Guenée described *Hoporina hesperidago* from an unpublished Abbot drawing, which is without a doubt the species that has been called *Pyreferra indirecta* Wlk. by McDunnough in his 1938 Checklist and *Conistra indirecta* by other workers following Hampson. Guenée's description is repeated here to

make it available to those persons to whom the above work is inacessible, and it amply bears out my contention as to the identity of the species in question.

"38 mm. Ailes supér. coupées carrément, comme chez *croceago,* d'un fauve-orangé, nuancé de jaune-safrané et de rouge, avec quatre lignes d'un rouge-brique, presque parallèles et presque égalemant écartées: l'extrabasilaire et la subterminal un peu ondées; le coudee et l'ombre médiane presque droites: la première ne formant un coude que près de la côte; la seconde linéaire et séparant les deux taches ordinaires: l'orbiculaire annulaire et rouge; la réniforme indiquée seulement par le point noir du base. Ailes infér. d'un blanc-jaunâtre, avec deux lignes fine, parallèles et non ondées et un liseré terminal rougeâtres."

The types of *indirecta* and *gracfiana* are in the British Museum, and Mr. W. H. T. Tams assures me that they are one species; as such they are referrable to *hesperidago.* The type of *moffatiana* is in the United States National Museum and is likewise referrable here.

The last mention of *hesperidago* in American entomological literature appears to have been by Grote in his 1875 Checklist of the Noctuidae of America, North of Mexico, page 14, footnote 16; following this the name has been ignored by all workers in the Noctuidae.

**Pyreferra citrombra** n. sp.

Head russet ochre intermingled with dark hairs; thorax ochre brown, collar darker, patagia with a dark russet brown line across the tip. Abdomen pale creamy yellow, the lateral and anal tufts concolorous.

Forewings ochreous, very heavily irrorate with varying degrees of russet fuscous, with an evident silken sheen; the basal half-line straight, dark russet fuscous with a pale shade on the outer side; antemedial line absolutely straight, orange russet in color with a pale shade on the inner side; the median shade straight, of the same color as the antemedial line, with a pale shade on the inner side, not as noticeable as that of the antemedial line; the postmedial line angled sharply outward from below costa, then oblique and straight to inner margin, of the same color as the antemedial line and the median shade, with a distinct pale shade on the inner side; the four aforementioned lines almost parallel; subterminal line vague, irregular, with a

pale shade on the inner side; terminal line lunulate, dark blackish brown; the fringe concolorous with the general tone of the wing; orbicular rather inconspicuous, small and round; reniform constricted at middle on outer side, the inner side resting on the median shade; both ordinary spots ringed by orange russet scales; reniform with a few dark scales in base. Hindwings pale creamy yellow, with a very evident silken sheen; postmedial line pale reddish russet, parallel to the outer margin; terminal line lunulate of the same color as the postmedial line; fringe concolorous with the general tone of the wings. Below, the fore and hind wings creamy white with a silken sheen; a common postmedial line of reddish russet, crossing both wings, following the same course as that on the upper side; terminal line of both wings lunulate, dark reddish russet; hind wings with faint discal spots. Expanse: 28-35 mm.

♂ genitalia somewhat asymetrical; the uncus short and broad; the tegumen broad; the vinculum long and moderate; valves assymetrical, especially at the apex, the left valve stouter than the right, corona absent, represented by a few hairs, claspers moderately long and irregularly bent; aedoeagus moderately long and stout, the vesica armed only with very minute spinules.

*Holotype*: ♂, Ithaca, NEW YORK, Sept. 22, 1940 (J. G. Franclemont), [in Coll. Franclemont]. *Allotype*: ♀, Ithaca, NEW YORK, Oct. 2, 1940 (J. G. Franclemont), [in Coll. Franclemont]. *Paratypes* all from New York: 23 ♂ ♂, 33 ♀ ♀, Ithaca, Sept.-April (J. G. Franclemont), 4 ♂ ♂ 3 ♀ ♀, McLean Bogs Reserve, Tompkins County, Oct.-Apr. (J. G. Franclemont), [in Coll. Franclemont]; 16 ♂ ♂, 26 ♀ ♀, Horseheads, Oct.-Apr. (L. R. Rupert), [29 in coll. Rupert, 13 in Coll. Franclemont]; 1 ♂, Sardinia, Oct., (L. R. Rupert), [in Coll. Rupert]; 9 ♂ ♂, 3 ♀ ♀, Ithaca, Oct.-Apr. (Various Collectors), [in Cornell Univ. Coll.].

This species differs from *ceromatica* and *pettiti* by the dark ordinary lines contrasting with the ground color and by the lack of evident dark points on the veins on the outside of the postmedial line, and further from *ceromatica* by its very light color, that of *ceromatica* being deep vinous red, it is also considerably yellower than *pettiti*, which is rather bright orange. From *hesperidago* Gn. (*indirecta* Wlk.), the closest species

superficially, it differs, first, in its paler color, *hesperidago* being bright, fiery orange; second, the ordinary lines (except the basal) are straighter and preceded on their inner sides by pale shades; third, the hindwings are also much paler, lacking the orange tint of *hesperidago*.

The male genitalia differ from *hesperidago* and *ceromatica* in that they lack a pollex on the left valve, and from *pettiti*, which they most nearly resemble, in that they have a narrower uncus, broader claspers, broader apices to the valves and a generally larger size.

This is the species that has erroneously been identified as *graefiana* Grt. and is figured as such by Barnes and McDunnough, Contrib. Nat. Hist. Nat. Lep. N. Am., iv (2), pl. xv, fig. 16, 1918, but it cannot conceivably be that species, as the type of *graefiana* is in the British Museum, and is equal to *hesperidago* Gn. (*indirecta* Wlk.). I cannot agree with the two aforementioned authors that this type is spurious. Since no other type has turned up, as they suggested might[1], when they discussed the matter in the Contributions, iv (2), pp. 102-103, 1918, I feel that the type in the British Museum is unquestionably the real one. I am inclined to believe, moreover, that they have misinterpreted the original description: Grote definitely says, "Yellowish, powdered with deep orange," and the species under discussion is never that color, whether it be from the fall or the spring; then too, he says that the hind wings have a distinct orange cast, leaving the costal region free; this species has no such orange cast, the costal region being of the same pale yellow color as the disk of the wing. As one carefully considers the original description of *graefiana* point by point with specimens of both species before him, only one conclusion can be reached, that *graefiana* is a synonym of *hesperidago* (*indirecta*).

[1] In a letter of October 20, 1938, Mr. J. F. Gates Clarke of the United States National Museum has assured me that no type or specimen that might possibly be the type of *graefiana* Grt. was obtained with the Brooklyn Museum collection, which contained the Graef Collection. It was in this latter collection that Barnes and McDunnough thought another type might be found.

# Current Entomological Literature

**COMPILED BY V. S. L. PATE, L. S. MACKEY and J. W. CADBURY.**

Under the above head it is intended to note papers received at the Academy of Natural Sciences of Philadelphia pertaining to the Entomology of the Americas (North and South), including Arachnida and Myriopoda. Articles irrelevant to American entomology will not be noted; but contributions to anatomy, physiology and embryology of insects, however, whether relating to American or exotic species will be recorded.

This list gives references of the current or preceding year unless otherwise noted. All continued papers, with few exceptions, are recorded only at their first installment.

For records of Economic Literature, see the Experiment Station Record, Office of Experiment Stations, Washington. Also Review of Applied Entomology, Series A, London. For records of papers on Medical Entomology, see Review of Applied Entomology, Series B.

**Note.** References to papers containing new forms or names not so stated in titles are followed by (*); if containing keys are followed by (k); papers pertaining exclusively to neotropical species, and not so indicated in the title, have the symbol (S) at the end of the title of the paper.

**The figures within brackets [ ]** refer to the journal in which the paper appeared, as numbered in the list of Periodicals and Serials published in our January and June issues. This list may be secured from the publisher of **Entomological News** for 10c. The number of, or annual volume, and in some cases the part, heft, &c., the latter **within** ( ) follows; then the pagination follows the colon :

**Papers published in the Entomological News are not listed.**

**GENERAL.—Alexander, C. P.**—Frederick Wallace Edwards. [4] 73: 94-95. **Bohart & Stahler.**—Winter insect collecting in Mexico. [55] 17: 96. **Davis, W. T.**—Charles W. Leng and the Brooklyn Entomological Society. [19] 36: 45-49, ill. **Essig, E. O.**—Charles William Woodworth. February, 1941. 2 pp., ill. The University of California Entomological Society and The Entomologist's Daily Post Card. [55] 17: 73-74. **Felt & Bromley.**—Major shade tree insects of 1940. [12] 34: 180-181. **Frost, S. W.**—Transparencies for certain insect and plant materials. [12] 34: 319, ill. **Mengel, Levi W.**—In Memoriam. Reading Public Museum and Art Gallery. 1941. 23 pp., ill. **de la Torre-Bueno, J. R.**—Edward Payson van Duzee. An appreciation. [19] 36: 80-81. Casting up accounts. Directed to authors. [19] 36: 93. **Usinger, R. L.**—Obituary. [55] 17: 84. **Wade & Hyslop.**—Obituary notice of Samuel Henshaw. [10] 43: 108-110. **Zerny, H.**—Hans Rebel. [64] 25: 113-115, ill.

**ANATOMY, PHYSIOLOGY, ETC.—Beall, G.**—The study of the effect of temperature upon pupation. [Canadian Jour. Res.] 19: 177-184. **Headlee, T. J.**—Further studies of the relative effects on insect metabolism of temperatures derived from constant and variable sources. [12] 34: 171-174.

**ARACHNIDA AND MYRIOPODA.—Archer, A. F.**—The Argiopidae or orb-weaving spiders of Alabama. [Ala. Mus. Nat. Hist.] Mus. Pap. 14: 77 pp., ill. **Chamberlin, R. V.**—On five new polydesmid millipeds from Mexico. [95] 54: 63-66, ill. **Loomis, H. F.**—Millipeds collected in Puerto Rico and the Dominican Republic by Dr. P. J. Darlington in 1938. [Bull. Mus. Comp. Zool.] 88: 17-80, ill. New genera and species of millipeds from the southern peninsula of Haiti. [Jour. Washington Acad. Sci.] 31: 188-195, ill. **Lundblad, O.**—Weitere neue wassermilben aus Brasilien und Paraguay. [28] 62: 122-126. **Stiles & Stevens.**—Studies of eastern Iowa spiders. [Proc. Iowa Acad. Sci.] 47: 333-342. **Verhoeff, K. W.**—Zur vergleichenden morphologie der Colobognathen. [Arch. Naturg. N. F.] 9: 501-511, ill.

**THE SMALLER ORDERS OF INSECTS.—Claassen, P. W.**—A catalogue of the Plecoptera of the World. [Cornell Univ. Agr. Exp. Sta.] Mem. 232: 235 pp. **Crawford, J. C.**—The genus Zonothrips in North America. [10] 43: 105-107, ill. **Eichler, W.**—Wirtsspezifität und stammesgeschichtliche gleichläufigkeit bei parasiten im allgemeinen und bei Mallophagen im besonderen [34] 132: 254-262. **Hanson, J. F.**—Studies on the Plecoptera of North America. [19] 36: 57-66, ill. (*k). **Hubbard, C. A.**—Ectoparasites of western Lagomorpha. [Pacific Univ. Bull.] 37: 8 pp., ill. A review of the western fleas of the genus Malaraeus with one new species and the description of a new Thrassis from Nevada. [Pacific Univ. Bull.] 37: 4 pp., ill. **Wilson, F. H.**—The slender lice of American pigeons and doves with descriptions of two new species. [Jour. Parasit.] 27: 259-264, ill.

**ORTHOPTERA.—Günther, K.**—Ueber die verbreitung einiger insekten um gebiete des Amazonenstromes und die frage eines columbischen faunendistriktes in der brasilianischen subregion. [Arch. Naturg. N. F.] 9: 450-500, ill.

**HEMIPTERA.—Barber, H. G.**—A new species of Tibraca, injurious to rice in Ecuador (Pentatomid.). [10] 43: 110-111, ill. **Drews, E. A.**—Aphididae of Nevada with a new genus and species. [55] 17: 59-61, ill. **Knight, H. H.**—New species of Irbisia (Mirid.). [19] 36: 75-79. **McConnell, H. S.**—New species of Pseudococcidae. [10] 43:

93-105, ill. **Mazzotti, L.**—Experimental infection of Haematosiphon inodora with Trypanosoma cruzi. [19] 36: 67-68. **Millspaugh, D. D.**—Preliminary survey and ecological notes of Iowa Corixidae. [Proc. Iowa Acad. Sci.] 47: 331-332, ill. **Oman, P. W.**—Revision of the nearctic Megopthal minae (Cicadellid.). [91] 31: 203-210, ill. (k*). **Padley, C.** —A list of the leaf hoppers (Cicadellid.) in the Iowa Insect Survey Collection [Proc. Iowa Acad. Sci.] 47: 393-395. **Pelaez, D.**—Un caso de segmentacion anormal asimetrica en el abdomen de una larva de Triatoma. [121] I: 406-408, ill. **de la Torre-Bueno, J. R.**—Help notes toward a revision of the genus Harmostes. [19] 36: 82-92. (k). **Usinger, R. L.**—Notes and descriptions of neotropical Triatominae (Reduviid.). [55] 17: 49-57, ill. (k). **Wood, S. F.**—Notes on the distribution and habits of reduviid vectors of Chagas' disease in the southwestern United States. (Reduviid.). [55] 17: 85-94, cont.

**LEPIDOPTERA.—Dampf, A.**—Nota sobre la biologia del Noctuido Antaplaga. [121] I: 454-455, ill. **Fletcher, T. B.**—A noctuid larva living in animal tissues. [8] 77: 107. **Franclemont, J. G.**—Gluphisia lintneri and related species (Notodontid.). [4] 73: 92-94, ill. **Maria, H. A.**—Catalogo explicativo de las ropaloceras Colombianas del Museo del Instituto de la Salle. [Rev. Acad. Colombiana Cien., Fis. y Nat.] 4: 61-63. **Mortimer, M. F.**—The life history and control of the pine tip moth, Rhyacionia frustrana (Tortricidae) at Nashville, Tennessee. [Jour. Tenn. Acad. Sci.] 16: 190-206, ill. **Newcomb, W. W.**—Note on the occurrence of Oeneis macouni. [19] 36: 56. **Richards, A. G.**—The genus Arugisa in the United States, with the description of a new species (Phalaenid.). [40] No. 1114: 4 pp., ill. A new species of Metalectra from Florida (Phalaenid.). [40] No. 1115: 2 pp., ill. The noctuid moths of the Galapagos Islands from the collections of the Allan Hancock Foundation. [Allan Hancock Pac. Exp.] 5: 233-251, ill. The genus Bulia in Mexico and Central America. (Phalaenid.). [Allan Hancock Pac. Exp.] 5: 255-267, ill. The male genitalia of Epipomonia multipunctata (Epipyrop.). [Allan Hancock Pac. Exp.] 5: 271-275, ill. **Zerny, H.**—Ueber Caligopsis seleucida (Brassol.) [64] 25: 150-152, ill.

**DIPTERA.—Aczel, M.**—Vorarbeiten zu einer monographie der Dorylaiden. [34] 132: 149-169, ill. (k*).

**Aitken, T. H. G.**—A new American subgenus and species of Aëdes. (Culicid.). [55] 17: 81-84. **Alexander, C. P.**—New nearctic crane-flies (Tipulidae). [4] 73: 85-90. **Bohart, G. E.**—The oviposition of conopid flies upon smaller andrenid bees. [55] 17: 95-96. **Brookman, B.**—A new Californian Stenopogon (Asilid.). [55] 17: 78-80. **Buddington, A. R.**—The nutrition of mosquito larvae. [12] 34: 275-280. **Curran, C. H.**—New neotropical Tachinidae. [40] No. 1113: 5 pp. (k). **Halvorson & Jaques.**—A preliminary list of the crane flies (Tipulidae) of Iowa. [Proc. Iowa Acad. Sci.] 47: 329-330. **Hase, A.** — Parasitologische betrachtungen uber pupiparen insbesondere uber crataerina. [Zeit. Parasitenkde] 11: 637-651, ill. **MacCreary, D.**—Comparative density of mosquitoes at ground level and at an elevation of approximately one hundred feet. [12] 34: 174-179, ill. **Ouellet, J.**—Additions au catalogue des dipteres du Quebec. [Le Nat. Canadien] 68: 121-141. **Reeves, W. C.**—The genus Orthopodomyia in California. [55] 17: 69-72. **Vargas, L.**—New variety of Anopheles pseudo-punctipennis (Culicid.). [19] 36: 73-74. **Wilcox, J.**—New Heteropogon with a key to the species (Asilid.). [19] 36: 50-56.

**COLEOPTERA.—Balthasar, V.** — Neue Canthidiumarten. [Ent. Nachricht.] 13: 111-140. (s) **Barber, H. S.**—Species of fireflies in Jamaica (Lampyridae). [Proc. Rochester Acad. Sci.] 8: 48 pp., ill. (k*). **Barr, W. F.**—Distributional notes and new records of Acmaeodera (Buprestid.). [55] 17: 62-69. **Fiedler, C.**—Neue südamerikanische arten der gattung Rhyssomatus (Cryptorhynch.). [Ent. Nachricht.] 13: 81-92. **Leech, H. B.**—The species of Matus, a genus of carnivorous water-beetles (Dytiscid.). [4] 73: 77-83, ill. The male of Hydroporus coelamboides. [4] 73: 96. Collecting of the rare water beetle Laccornis difformis by the late Ch. Roberts. [4] 73: 96. **Malkin, B.**—A new locality for Cantharis cartwrighti. [19] 36: 96. **McDunnough, J.**—A new coleophorid of the metalic-winged group. [4] 73: 91, ill. **Precht, H.**—Ein beitrag zur biologie der triungulinuslarven von Meloë. [34] 132: 245-254, ill. **Saylor, L. W.**—A new Mexican scarab beetle. [95] 54: 67-68. **Stone, M. W.**—Life history of the sugar-beet wireworm in Southern California. [U. S. Dept. Agric.] Tech. Bull. 744: 87 pp., ill. **Uhmann, E.**—Amerikanische Hispinen aus dem Berliner Museum. [28] 61: 14-18, ill. Die genotypen der von mir aufgestellten Hispinen-gattungen. [28] 61: 143-

144. **Wright & Whitehouse.**—Additions to the list of Cincinnati Coleoptera. [19] 36: 69-73.

**HYMENOPTERA.—Bequaert, J.** — Pseudodynerus, a neotropical complex of Eumenine wasps (Vespid.). [40] No. 1106: 10 pp., ill. (*k). **Bohart, R. M.**—Yellowjackets versus campers. [55] 17: 58. **Duran-Moya, L.**—Die Thynniden Chiles. [Arch. Naturg. N. F.] 10: 71-176, ill. **Gahan, A. B.**—A revision of the parasitic wasps of the genus Necremnus (Eulophid.). [91] 31: 196-203. (k*). **Gaul, A. T.**—An unrecorded sleeping habit of Dolichovespula arenaria (Vespid.). [19] 36: 49. **Hitchings, J. M.**—A comparison in size of pollen baskets of three races of honeybees. [Proc. Iowa Acad. Sci.] 47: 405-408, ill. **Martorell, L. F.** —Biological notes on the sea-grape sawfly, Schizocera krugii in Puerto Rico. [Caribbean Forester] 2: 141-143, ill. **Walley, G. S.**—A new species of Mirax parasitic on Coptodisca arbutiella (Braconid.). [4] 73: 83-84.

INSECTS AND THEIR STORIES. By HARRY HOOGSTRAAL with camera studies by MELVIN MARTINSON and drawings by Dr. CARL O. MOHR. Thomas Y. Crowell Company, New York, 1941, 7¾ inches high x 9¾ inches wide. 144 pages, including 46 full-page half-tone reproductions of photographs of entire insects and 38 drawings of whole insects or of parts. $2.00—A non-technical account of the form, habits and life-history of 46 different insects under their common names, grouped in five sections: Introduction, Insects of the house, garden, trees and woods, in or near the water. The most striking feature of the book is the photographic reproductions, but while some of these, such as the stink bug, buckeye, cabbage and tiger swallow tail butterflies, lacewing, dobson fly and water strider are, as the jacket says, "clear," others, such as most (but not all) of the beetles, the honeybee, hornet and thread-waisted wasp, are cloudy or indistinct, owing to the lack of contrast with the background or to faulty focussing. Prof C. L. Metcalf, of the Department of Entomology, University of Illinois (where Mr. Hoogstraal is a graduate student) writes the foreword. At the end is an "Index and guide to recognition of insects . . . arranged according to orders" and an alphabetical index.—P. P. CALVERT.

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# A Stenogamic Autogenous Strain of Culex pipiens L. in North America (Diptera: Culicidae).

By A. GLENN RICHARDS, Jr., Zoological Laboratory, University of Pennsylvania.

This preliminary note is to call attention to the fact that the *Culex pipiens* complex in the eastern United States shows a differentiation similar to that shown by this complex in Europe. There it is the only known genetically diverse species or species group of the subfamily Culicinae. However, the problem of anopheline races has recently received attention in this hemisphere (Hoffman, 1936; King, 1939; Hinman, 1940; de Leon, 1940; Vargas, 1941) following the extensive work on the European *Anopheles maculipennis* complex (see Hackett, 1937; Bates, 1940).

During the past two years I have used for histological and other purposes a strain of *Culex pipiens* that apparently established itself in the vivarium of our laboratory years ago. This strain breeds there unattended and maintains itself by breeding continuously during all seasons of the year (Philadelphia, Pennsylvania). Using Roubaud's terminology, this strain is autogenous, *i. e.*, can breed without taking a blood meal, stenogamic, *i. e.*, mates readily in a confined space, and homodynamic, *i. e.*, does not have a true winter diapause although it may hibernate under adverse conditions. In contrast to this strain, there is another strain, also present in the eastern United States, which usually requires a blood meal (non-autogenous or anautogenous), and does not mate in a small space (eurygamic). No data are available on the question of whether or not this anautogenous eurygamic strain has an obligatory diapause (*i. e.* is heterodynamic).

In my laboratory, specimens emerged in small covered aquaria on six different occasions; and left undisturbed they laid viable egg rafts. In one case three successive generations were obtained without any special feeding for adults or larvae and without renewal of the water. In the other cases only one generation was produced, but it is to be noted that the rearing was in clear vivarium water without the added nourishment usually given larvae to speed their development and increase egg-laying. The number of eggs per raft was rather low (30-115, average about 65), and egg-laying did not take place until 5-8 days after emergence.

Observations in our vivarium where the adults fly around the room indicate that the same occurs there. The hundreds of egg rafts that have been seen in the vivarium tanks during these two years have all been relatively small, whereas engorged autogenous and engorged anautogenous females both are recorded as laying considerably larger rafts (150-300 or more eggs). Hundreds of adult females have been observed loose in the laboratory and in the vivarium; no specimen obviously engorged with blood has been seen and 25 randomly captured females on being dissected showed no visible evidence of blood. Finally, although various persons are around the vivarium during the evening, as well as during the day, I have heard only one report of the mosquitoes attempting to bite during the winter and early spring (during summer months there is an influx from out-of-doors).

The preceding observations established the autogenous character of this line. I must add that not all females lay eggs although some did in every batch tested. In the three aquaria that were set-up specifically to observe this (at different times), there were never as many egg rafts as there were females. Also, in one of the six cases treated some of the egg rafts were non-viable, presumably having been laid by virgin females (it is well known that eggs from virgin female mosquitoes are not viable). This agrees with European data which shows 40-86% of the females of autogenous lines capable of laying

eggs (only 46-94% lay eggs if allowed to engorge with blood) (Tate & Vincent, 1936).

The data cited for the autogenous characteristic also indicate ability to mate in confinement (stenogamy). In addition to this presumptive evidence, pairs have been seen copulating on the sides of the aquaria during the daytime on a number of occasions. In the observed cases the male was resting on the side of the container and the female seemed to be the aggressor since she flew around the male and eventually came to rest on top of him. Copulation ensued, the male appearing passive throughout the entire performance. Mating has been observed in a round jar with an air-space of approximately 6¼ x 6 inches (200 cu. in.), and judging from viable egg rafts must have occurred in a round jar of approximately 5 x 5 inches (115 cu. in.).

For the third character (homodynamic development), there is obviously no seasonal interruption in our moderately heated vivarium. In our unheated frog room adults continue activity until ice is present out-of-doors and larvae continue to develop in spite of some ice in the aquaria each night. On warmer days pupation occurs. The winter temperature of this room is too low for adult activity, and only the one brood of larvae occurs after the appearance of ice during the night.

I accidentally discovered another interesting feature of this strain, namely its lack of phototropism. Adults are not attracted to lights in the laboratory, and while they usually rest in the darker *damp* places, they commonly fly around during the day. In January, 1941, I gave some hundreds of larvae and pupae to Mr. H. B. Weiss for use in his studies on light reactions. Mr. Weiss writes that he tested 64 adults in three different trials several days after emergence and that they failed to react either positively or negatively to different wave lengths of light (for his technique see Weiss, Soraci & McCoy, 1941). This contrasts with definite reactions obtained by him for the yellow-fever mosquito, *Aedes aegypti*, but agrees with the indifference to light reported by Tate & Vincent (1936) for European autogenous strains.

The idea of two strains of *Culex pipiens* is also supported by field observations made on Long Island, New York. These observations taken alone have little or no validity, but are most amenable to the idea of two strains existing there. On Long Island, larvae of *C. pipiens* are occasionally found in small numbers in water containing some ice. Occasional reports come in of winter activity—in one case in February, 1941, Mr. D. E. Longworth sent me series including as many males as females; yet only females are known to hibernate, so this could hardly represent emergence of a diapausing group. Aquaria placed on exhibit there during the summers of 1936 and 1937 sometimes gave adults showing stenogamic autogenous characteristics, but in most cases no egg rafts were produced (exhibits at different times and larvae from various sources). Light traps used to sample mosquito populations usually produced satisfactory samples (positive phototropism), but in certain areas produced no *C. pipiens,* although adults were fairly common within the immediate vicinity of the trap. This may have been due to the inconsistency of trap-light efficiency, but it is also possible that it reflects the absence of phototropism found for my autogenous strain by Mr. Weiss and recorded for the European strain by Tate & Vincent.

The presence of autogenous individuals in the United States has already been recorded by Mitchell (1907) and Huff (1929) but these authors did not recognize the inherited nature of this characteristic. In Europe Roubaud (1929-1933), Weyer (1935), Tate & Vincent (1936), Marshall & Staley (1935-1937), Mathis (1940) and others have shown that the biological characteristics are definitely inherited. Claims have been made by Roubaud and Weyer that stenogamy versus eurygamy and autogeny versus anautogeny are simple Mendelian characters, but this is disclaimed by Tate & Vincent, who cite extensive experiments showing that within pure strains the characteristics were maintained for the duration of the 49 generations bred but that cross-breeding results were peculiar and certainly not genetically clear. Tate & Vincent also point

out that stenogamy is the best of the biological characteristics because of the great variability (40-86%) in the expression of the autogenous characteristic.

Marshall & Staley consider the autogenous and anautogenous forms in Europe to represent separate species. They retain the name *C. pipiens* L. for the anautogenous form and resurrect the name *C. molestus* Forskal for the autogenous form. The situation in this country certainly differs from that in England. In structural characters my autogenous strain does not agree with the description of *C. molestus* as given by Marshall & Staley. The males, while usually having the first four palpal joints somewhat shorter than the proboscis, commonly have longer palpi; the number of setae on the lobes of the ninth abdominal tergite is less (averaging even less than in the British anautogenous form), and the number of branches in each tuft of the respiratory siphon averages less. From the biological point of view, I have seen no indication that our anautogenous strain shuns human blood—in fact the contrary is true. The autogenous strain of this laboratory seldom seeks human blood, although autogenous lines at times certainly are pests of humans in this country; in Europe the autogenous form is reported as always an avid feeder on humans. It seems probable, therefore, that although stenogamic autogenous and eurygamic anautogenous lines occur in the eastern United States, we do not have an exact duplicate of the European situation.

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# A List of Butterflies Which May be Found Within 50 Miles of Philadelphia. (Lepid.: Rhopalocera).

By R. C. WILLIAMS, Jr., Research Associate, Acad. Nat. Sciences, Philadelphia.

The nomenclature follows that of Macy & Shepard's recently published "Butterflies".

The rare or doubtful species are indicated by an asterisk. Authentic data on the occurrence of any of these or of any species omitted from the list will be appreciated by the American Entomological Society or the writer.

PAPILIO

1 PHILENOR L.
2 AJAX L.
3 CRESPHONTES Cr.
4 GLAUCUS L.
♀ f. TURNUS L.
5 TROILUS L.
6 MARCELLUS Cr.

ANTHOCHARIS

7 MIDEA Hüb.

COLIAS

8 EURYTHEME Bd.
f. KEEWAYDIN Edw.
f. ERIPHYLE Edw.
f. AMPHIDUSA Bd.
9 PHILODICE Godt.

ZERENE

10 CESONIA Stoll.

PHOEBIS

* 11 SENNAE* L.
r. EUBELE L.

EUREMA

12 LISA Bd. LeC.
13 NICIPPE Cr.

PIERIS

14 PROTODICE Bd. LeC.
15 NAPI L.
f. OLERACEA Har.
16 RAPAE L.

DANAUS

17 PLEXIPPUS L.

ENODIA

18 PORTLANDIA F.

MEGISTO

19 MITCHELLII French
20 EURYTUS F.

SATYRODES

21 EURYDICE Johan.

MINIOS

22 ALOPE F.
r. MARITIMA Edw
* r. NEPHELE Kir.

DIONE

* 23 VANILLAE L.

EUPTOIETA

24 CLAUDIA Cr.

ARGYNNIS

25 IDALIA Dru.
26 CYBELE F.
27 APHRODITE F.
* 28 ATLANTIS Edw.

BRENTHIS

29 MYRINA Cr.
30 BELLONA F.

EUPHYDRYAS

31 PHAETON Dru.

PHYCIODES
32 NYCTEIS West.
33 THAROS Dru.
f. MARCIA Edw.
f. MORPHEUS Edw.
* 34 BATESII Reak.

POLYGONIA
35 INTERROGATIONIS F.
36 COMMA Har.
f. DRYAS Edw.
* 37 SATYRUS Edw.
38 FAUNUS Edw.
* 39 PROGNE Cr.

NYMPHALIS
40 J-ALBUM Bd. LeC.
* 41 MILBERTI Godt.
42 ANTIOPA L.

VANESSA
43 ATALANTA L.
44 VIRGINIENSIS Dru.
45 CARDUI L.

JUNONIA
46 COENIA Hub.

BASILARCHIA
47 ARTHEMIS Dru.
hy. f. PROSERPINA Edw.
48 ASTYANAX F.
49 ARCHIPPUS Cr.

ASTEROCAMPTA
50 CELTIS Bd. LeC.
51 CLYTON Bd. LeC.

LIBYTHEA
52 BACHMANII Kirt.

NYMPHIDIA
* 53 BOREALIS Gr. Rob.

ATLIDES
* 54 HALESUS Cr.

STRYMON
* 55 CECROPS F.
* 56 M-ALBUM Bd. LeC.
57 MELINUS Hüb.
* 58 FAVONIUS Ab. Sm.
* 59 TITUS F.
60 ACADICA Edw.
61 EDWARDSII Saund.
62 FALACER Godt.
63 LIPAROPS Bd. LeC.

MITOURA
64 DAMON Cr.

INCISALIA
65 AUGUSTUS Kir.
* 66 IRUS Godt.
67 HENRICI Gr. Rob.
68 POLIOS Cook Wats.
69 NIPHON Hub.

FENISECA
70 TARQUINIUS F.

LYCAENA
71 THOE Gray.
* 72 EPIXANTHE Bd. LeC.
73 HYPOPHLEAS Bd.

EVERES
74 COMYNTAS Godt.

GLAUCOPSYCHE
75 LYGDAMUS Doub.

LYCAENOPSIS
76 PSEUDARGIOLUS Bd. LeC.
r. LUCIA Kir.
f. MARGINATA Edw.
f. NEGLECTA Edw.

URBANUS
77 PROTEUS L.

PROTEIDES
78 CLARUS Cr.

ACHALARUS
79 LYCIADES Gey.

AUTOCHTON
* 80 CELLUS Bd. LeC.

THORYBES
81 BATHYLLUS Ab. Sm.
82 PYLADES Scud.
f. IMMACULATA Skin.

PYRGUS
83 COMMUNIS Grote.
* 84 CENTAUREAE Ramb.

PHOLISORA
85 CATULLUS F.
* 86 HAYHURSTII Edw.

ERYNNIS
87 ICELUS Scud. Burg.
88 BRIZO Bd. LeC.
89 MARTIALIS Scud.
* 90 LUCILIUS Scud. Burg.
* 91 BAPTISAE Forbes.
92 PERSIUS Scud.
93 JUVENALIS F.
94 HORATIUS Scud. Burg.
* 95 ZARUCCO Luc.

CARTEROCEPHALUS
* 96 PALAEMON Pall.

ANCYLOXYPHA
97 NUMITOR F.

HESPERIA
98 SASSACUS Har.
* 99 UNCAS Edw.
100 LEONARDUS Har.
*101 METEA Scud.
*102 ATTALUS Edw.

HYLEPHILA
103 PHYLEUS Dru.

ATALOPEDES
104 CAMPESTRIS Bd.

POLITES
105 THEMISTOCLES Lat.
106 MANATAAQUA Scud.
107 VERNA Edw.
108 PECKIUS Kir.
109 MYSTIC Scud.
110 BRETTUS Bd. LeC.

WALLENGRENIA
*111 OTHO Abb.-Sm.
r. EGEREMET Scud.

POANES
112 HOBOMOK Har.
♀ f. POCAHONTAS Scud.
113 ZABULON Bd. LeC.
114 MASSASOIT Scud.
f. SUFFUSA Laurent.
* r. HUGHI Clark.
*115 AARONI Skin.
116 VIATOR Edw.

ATRYTONE
117 RURICOLA Bd.
118 BIMACULA Gr. Rob.
*119 AROGOS Bd. LeC.
120 LOGAN Edw.
121 CONSPICUA Edw.
122 DION Edw.

ATRITONOPSIS
123 HIANNA Scud.

LEREMA
124 ACCIUS Ab. Sm.

AMBLYSCIRTES
125 VIALIS Edw.
126 HEGON, Scud.

LERODEA
127 L'HERMINIER Lat.

CALPODES
128 ETHLIUS Cr.

PANOQUINA
129 OCOLA Edw.
130 PANOQUIN Scud.

# The Genus Colias in North America (Lepidoptera: Pieridae).

By Austin H. Clark, U. S. National Museum,
Washington, D. C.

(Continued from page 187.)

The dark border of the wings in the males is exceedingly variable, ranging from vestigial to very dark and broad, 7 mm. wide at the narrowest point in a specimen with the fore wings 30 mm. long. In a long-winged spring male with the fore wings 22 mm. long, taken on April 12, 1938, the border of the fore wings below vein 4 is represented by a fine diffuse dusting of dark scales forming a series of narrow crescents, with the convexity inward, one in each interspace. Anterior to vein 4 the dark dusting in the interspaces extends further and further inward so that the whole apex is dusted with dark scales; the infuscated apical area is crossed by broadly yellow veins and there is a marginal more or less semicircular yellow spot at the outer end of each interspace. On the hind wings there is a dusting of dark scales at the ends of the interspaces between veins 4 and 5, 5 and 6, and 6 and 7, that between veins 5 and 6 the most extensive, that between veins 6 and 7 smaller, and that between veins 4 and 5 very slight. The margin of the wing beyond these small patches of dark scales is narrowly yellow.

The reduction of the dark border in the males to a rather faint and very narrow submarginal dusting of dark scales is rare; usually the border is continuous and dark, and the dark scales extend outward to the base of the fringe. On the fore wings the dark border varies in width in its lower half from scarcely more than one-third of an interspace to more than twice the width of an interspace. Most commonly it is approximately the width of an interspace, often slightly more or slightly less.

When the border of the fore wings is narrow its inner edge is frequently deeply indented by long narrow angles running inward along the veins, and the veins may cross it as narrow yellow lines. Most commonly, however, only the veins at the apex are yellow, and these do not quite reach the outer edge. When the dark border is broad the inner edge may be more or less deeply scalloped, the black of the border extending outward as long narrow angles along the veins. In most cases the inner edge of the dark border is simply irregular.

In the males the dark border of the hind wings is developed proportionately to that of the fore wings. It may reach downward to vein 1, but usually ends at about vein 2. When the border is narrow it may not pass vein 3, and in extreme cases it is developed only between veins 6 and 4.

In the females the inner edge of the dark border of the fore wings is abruptly bent inward in the interspace between veins 3 and 4. Rarely it is broadly curved inward in its anterior half as is the case in *C. werdandi.* The inner edge of the border is usually very irregular, though occasionally smooth. The spots in the dark border vary greatly in size, being largest in the small light orange individuals. They are usually of different sizes, that in the interspace between veins 3 and 4 being much smaller than the others or absent. Rarely they are large and subequal and more or less confluent, forming a partially interrupted broad yellow band separated from the orange or yellow of the inner portion of the wing by a narrow dark band of uniform width broadly and evenly curved in its anterior half. Not infrequently the spots are entirely absent, the black border then closely resembling that of the male. In spring individuals the dark border is narrower than it is in summer individuals, and below vein 4 the inner portion may be narrow, vestigial, or even entirely absent, the dark border of the female then resembling approximately that of the male except for the inclusion of a curved row of four spots in the apical portion. Similar borders are found in the south Russian forms *chryseis* and *diana* of *C. erate.*

On the hind wings in the females the dark border may be narrow, resembling that of the male though with the inner edge vaguely defined. Sometimes it is as broad and continuous as it is on the fore wings with the inner edge well defined and parallel to the edge of the wings, and completely enclosing a row of subequal yellow spots, largest anteriorly, one in each interspace, much as in the females of *C. eogene* from Kashmir. Usually it is broad anteriorly where it completely encloses from one to three spots, the inner border then becoming obsolescent or represented by a slight dusting of dark scales in the interspaces. Occasionally the border is represented merely by long narrow dark triangles with their bases outward that extend inward along the veins. Rarely it is wholly absent, there being merely a few dark scales at the outer ends of the anterior veins.

The spot at the end of the cell of the fore wings is usually well developed, black, and conspicuous, sometimes with an orange, yellow, or white center. Rarely it is much enlarged,

taking the form of a black circular ring surrounding a white center. It may be reduced to a narrow line, or even vestigial, represented simply by a few dusky scales. Not infrequently it is produced into a more or less extended angle on the side toward the apex. It may be bright orange instead of black. In pale orange early spring individuals it is commonly more or less broadly bordered with orange or mixed with orange scales, sometimes entirely orange.

The spot at the end of the cell of the hind wings varies from pale straw yellow to orange red. In light orange spring individuals it is sometimes very large, its greatest diameter, parallel to the cell, being as great as the maximum width of the cell. Usually it is somewhat less in diameter than the width of the interspace between veins 4 and 5. Rarely it is very small, only about one-third the width of this interspace. There is usually a small supplementary spot on its outer side just across vein 5, but this may be absent, especially if the spot be small.

The wing bases above are usually marked with blackish scales. In the males these may be very dark, and the blackish patch is sometimes extended as a sooty infuscation along the lower border of the fore wings half way to the outer margin, and also on the hind wings in the interspace between veins 1 and 2 and the lower half of the cell downward almost to the anal angle. In the females the infuscation is less dense than in the males, but more extensive. On the fore wings it may be confined to the costal border, though it commonly affects about the basal third of the fore wings and the area below the cell in the hind wings, becoming diffuse toward the outer edge. Occasionally the entire hind wing is infuscated except for a light marginal band or row of more or less indistinct spots.

In the females the veins of the fore wings for their whole length and the outer half of the veins of the hind wings may be narrowly blackish. Rarely in the males all the veins may be marked by narrow back lines. I have not seen an example of this last variety from Washington but Mr. Wagner has taken it in Nebraska.

The hind wings on the under side may be clear yellow, usually darker than on the upper side, yellowish white, yellowish orange, dull white, or grayish blue. They are usually more or less heavily dusted with dark scales, when the dusting is heavy becoming dusky olive yellow and in extreme cases in winter dull green with a broad indefinite lighter border.

The antemarginal spots on the under side of the fore wings are usually well developed with the three lowest the largest. In

the forms with very narrow dark borders above they may be as much as four times as far from the edge of the wings as the inner edge of the dark border; in the forms with broad borders they may be somewhat nearer the edge of the wing than the inner edge of the dark border. Usually they are approximately under the inner edge of the dark border, in most of the yellow males slightly further from the edge of the wings. This line of spots is usually straight and parallel with the outer edge of the wings, but it may be somewhat curved inward, especially in yellow males. In males in which the dark border is narrow, the outer edge of the fore wing markedly convex, and the spot at the end of the cell of the hind wings small and that at the end of the cell of the fore wings vestigial the spots are greatly reduced and not infrequently wholly absent.

The fringes of the wings vary from light dull olive with or without a pink edging to entirely bright pink. They are usually more or less dull rosy or pinkish.

This composite description covers all forms between the most extreme *eurytheme* (form *amphidusa*) and the most extreme *philodice*, including the yellow phase or variety of *eurytheme* and *eriphyle*. Two of the spring males if their origin were unknown would almost certainly be referred to *pelidne*.

To the insects included in the description 46 different names, covering species, subspecies, forms, and aberrations, have been applied. These names are usually divided between two accepted species, *eurytheme* and *philodice*. There is, however, no character or group of characters by which *eurytheme* and *philodice* may be distinguished. Originally in the east *philodice* ranged from the highlands of Georgia and the lowlands of northern North Carolina northward, becoming more and more distinctive toward the northeast. *Philodice* therefore is (or was) the northeastern representative of *eurytheme*.

Toward the west *philodice* intergrades insensibly with *eriphyle*, which is only an extreme form (with the subcentral spot on the upper surface of the secondaries reduced) of the yellow phase of *eurytheme*. Toward the northwest *eriphyle* passes into the more distinctive *kootenai*, and in the extreme south into *guatemalana*.

Comparison between *eurytheme* and the European and Asiatic *chrysotheme* fails to show any features by which the two may be differentiated; *eurytheme* and the forms associated with it should therefore be regarded as forms of *Colias chrysotheme* (Esper). The significant forms having a more or less definite significance are:

COLIAS CHRYSOTHEME (Esper)

*Colias chrysotheme eurytheme* Boisduval
*Colias chrysotheme eriphyle* W. H. Edwards
*Colias chrysotheme kootenai* Cockle
*Colias chrysotheme philodice* Godart
*Colias chrysothema guatemalana* Staudinger

The four yellow forms (*eriphyle, kootenai, philodice,* and *guatemalana*) occupy mainly, or largely, distinctive areas. The orange *eurytheme,* which has a yellow phase running directly into *eriphyle,* covers most of the range of *eriphyle* and part of the ranges of *kootenai* and *philodice.*

The relation of *Colias chrysotheme* to the other species of *Colias* in North America may be made clear by a brief analysis of the genus as a whole. The species of *Colias* fall naturally into five groups, as follows: 1. The *Crocea* group; a mealy patch at the base of the secondaries above; chiefly orange; Asia, Europe, Africa, and South America, with one species (*meadii*) in western North America. This passes into: 2 The *Hecla* group; no mealy patch; under side of secondaries green; chiefly orange; Alpine and Arctic in Asia, elsewhere Arctic, with one species (*hecla*) in northern North America. 3. The *Werdandi* group; an extreme development of the preceding; upper side also green or greenish and sexes similar; Alpine and Arctic in Asia and Europe, in North America Arctic (various forms of *werdandi*) and Alpine (*behrii* in California). The two following groups are distinct from the three preceding. 4. The *Hyale* group; no mealy spot; beneath usually yellow, sometimes orange, gray, or bluish; often infuscated; an antemarginal row of spots on the under side of the fore wings; sexes similar or different; chiefly yellow, sometimes orange, white or gray-blue; Asia, Europe, and Africa,

with one species (*chrysotheme*) over almost the whole of North America. 5. The *Palaeno* group; essentially as in the northern yellow forms of *chrysotheme* but without the antemarginal spots on the primaries below and with the dark margins in the females usually obsolescent; yellow, rarely white, the males of some species with an orange form; chiefly in the Rocky Mountain region and in boreal and subarctic North America; two species in Alpine and Arctic Asia and Europe; in North America represented by *occidentalis, harfordii, interior, christina, alexandra, gigantea, scudderii, pelidne,* and *palaeno.*

## Some Unusual Dragonfly Records from New Jersey (Odonata).

By John Gillespie, Glenolden, Pennsylvania.

During the past summer, while collecting dragonflies in New Jersey, I obtained five males and one female of *Celithemis verna* Pritchard. They were taken on July 12 and July 20, at Bennett, which is located in Cape May County, on the peninsula at the southern extremity of the state. This species was originally described in 1934 by Pritchard from specimens taken in Oklahoma and Georgia. Its occurrence in a region so far to the northeast as New Jersey seems particularly noteworthy. The identification has been confirmed by Dr. P. P. Calvert.

The environment in which *verna* was found consisted of an extensive boggy swamp and an adjoining sphagnum bog. The greater number were observed at the swamp, which was boggy around the edges, but with a large amount of open water in the middle. Several individuals in addition to those captured were seen.

Other species of *Celithemis* occurring here were *elisa, martha* and *eponina.* Some of the more noteworthy of the twenty-five species of dragonflies observed at Bennett, besides

*verna*, were *Anax longipes*, *Pantala hymenaea*, *Enallagma pictum*, and *Nehallenia gracilis*.

Other interesting captures were:

DOROCORDULIA LEPIDA (Hagen). Lake near Kirkwood, June 22.

CELITHEMIS MONOMELAENA Williamson. Keswick Grove, August 6; Atco, August 16.

ENALLAGMA CARUNCULATUM Morse. Lenape Lake, near Newton, August 31.

E. WEEWA Byers. Cedar stream at Chatsworth, August 3; two different localities on cedar streams between Whiting and Bamber, August 6.

E. DIVAGANS Selys. Cedar stream between Whiting and Bamber, August 6.

TELEALLAGMA DAECKII (Calvert). Reedy edge of lake near Newtonville, July 12.

NEHALLENIA INTEGRICOLLIS Calvert. Same as above.

ARGIA BIPUNCTULATA Hagen. Chatsworth and Keswick Grove, August 3.

## A "Zippered" Sweeping Net.

A very convenient sweeping net for micro-diptera was made of heavy unbleached muslin. The net tapered below to an open bottom of about five inches in diameter. To this bottom rim one side of a coat zipper (the type in which the two sides of the zipper may be completely separated) was sewn. Two or more cup-shaped bags were made whose rims were the same diameter as the open bottom of the net. To the rim of each cup-bag the opposite side of a coat zipper was sewn. Thus when zippered together a complete net was formed with quickly interchangeable bottoms. The cup part when swept full of insects and debris was tied with tapes near its mouth, un-zippered and inserted into a large cyanide bottle. Another cup-bag was zippered onto the net and the sweeping continued while the first lot of insects was being killed.—ELIZABETH G. FISHER, The Academy of Natural Sciences of Philadelphia.

# Notes on some Rare Scarabaeidae with the Description of One New Species. (Coleoptera).

By Mark Robinson, Sharon Hill, Pennsylvania.

For a long time it was apparent to me that some of our species of *Trox*, which were never found in the usual places where I had looked for them but where I found many other species, must be specialized, just like some of our *Aphodiini* and other *Scarabaeidae*. With this in mind I set out this spring to prove or disprove this theory. I had several clues on which to work viz: material collected by Sim and Frost, plus several specimens from unidentified sources.

The method used was to scour the woods for birds building their nests in the early spring and, after the birds had raised their young, collect the nests and examine them bit by bit. The nests ranged from ten to seventy feet in the air and were in a great variety of trees including Beech, White Oak, Chestnut, Sycamore, Red Maple, Tulip Poplar, Norway Spruce and White Pine.

In the case of such birds as crows, titmice and other Passerines, the *Trox* are feeding on the feathers used to line the nest or the hairs which crows will intertwine through their nests; hawks' and owls' nests will always have scattered through them hair and feathers from the mammals and birds with which the Raptores had fed their young. In order for the *Trox* to be able to subsist in these nests, the nests must be very thick, or be in the cavity of a tree, in order to preserve the moisture which the larvae must have in order to mature.

The nest which proved to be the most productive was that of a barn owl at Broomall, Pennsylvania. This abode was located about twenty feet above the ground in the hollow of a dead Chestnut tree. I have collected *Trox* in these woods for the past eight years without ever taking any of the species that were collected in this nest. These consisted of over five hundred specimens of *striatus, aequalis, affinis* and the new species described in the following pages.

Thanks are due to the following men for their assistance in

locating nests or otherwise helping in the studies undertaken in this paper: Nelson D. Hoy, Robert M. Stabler, R. C. Casselberry, M. W. Sanderson, R. J. Sim, C. A. Frost and R. Swett.

**Trox (Omorgus) tytus** new species.

It is remarkable that an insect as large as this could have remained out of the hands of taxonomists and collectors as long as has been the case. Until I examined the material taken in the Broomall Owl nest I had never seen this species and yet I have seen most of the large collections of *Trox* in this country.

The nearest known species to this one is *suberosus Fab.*, but *tytus* is smoother through-out, and the side margins of the pronotum are straight and not incised as they are in *suberosus*. In addition to the external characters, the male aedeagus has a very different shape. All the specimens in the type series were taken in barn owl (*Tyto alba pratincola* Bonap.) nests.

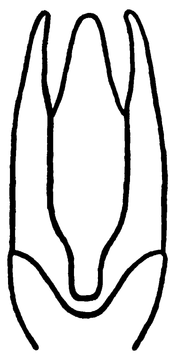

**Fig. 1. Dorsal view of aedeagus of *Trox tytus*.**

Oblong; completely covered with a yellowish-brown granule-pollinose, opaque coating. Interspersed over the body are yellowish-brown scale like hairs, which are a little more concentrated on the elytral tubercules. The underparts of the head and anterior tips of the tibiae are reddish and shining.

Clypeus triangular, rather strongly reflexed laterally. On either side of the median line and just to the rear of the genae is an elongate, deeply excavated pit. Head rounded without trace of tubercules.

Pronotal sides arcuate, converging to the rounded hind angles in the posterior one-sixth, sinuation within the hind angle well pronounced. Hind margin rounded medially, sinuate on each side. On the disk of the pronotum is an ill-defined median groove which runs posteriorly into a deeply, transversely excavated pit;. the sides of this pit are sloping. The usual tubercules of this subgenus are but vaguely indicated on the pronotum.

The elytral tubercules are low, barely rising above the plane of the intervals. The tubercules on the first and sutural rows are elongate and sometimes longitudinally confluent, the tubercules on the lateral rows are oval to rounded. The intervals are biseriately punctured. Humeral umbone moderately prominent while the apical umbone is indefinite.

Scape of antennae reddish, bristling with long ochraceous-orange hairs; funicle fulvous, glabrous; club testaceous. Apical process of anterior tibiae bifid, side margin of tibiae with a sharp denticle just back of the anterior process.

Wings: Length, 18 mm.; Breadth, 6.25 mm. Length, 12 to 13 mm.; Breadth, 7 to 8 mm.

*Type.*-- ♂ Broomall, Delaware County, PENNSYLVANIA, June 14, 1941 (Mark Robinson). *Allotype.*—♀, With same data as type.

*Paratypes.*—190 of both sexes; 162 Broomall, Pennsylvania, from May 29, 1941 to June 20, 1941 (Mark Robinson); 4 Broomall, Pennsylvania, June 1, 1941 (R. Stabler); 24 Lyndell, Pennsylvania, June 18, 1941 (Mark Robinson). Paratypes will be deposited in the collections of: Academy of Natural Sciences of Philadelphia; American Museum of Natural History; Museum of Comparative Zoology; United States National Museum; University of Kansas; O. L. Cartwright; M. A. Cazier; R. C. Casselberry and the writer.

TROX SIMI Robinson. 1940. Trans. Amer. Ent. Soc. LXVI, p. 157.

The type series of this species consisted of fifteen specimens found in New Jersey, Pennsylvania and Virginia. The food records I had at the time of description were: Hen feathers, mouse hair, dead crow, dead mole, old carpet and owl pellets. This year I have found ninety-two specimens in Broomall, Darby and Sharon Hill, Delaware County, Pennsylvania, from

April 28 to June 19. All specimens were found feeding on Barn Owl (*Tyto alba pratinicola* Bonap.) pellets which were disgorged on the ground beneath the trees in which the owls roosted.

TROX AEQUALIS Say. 1832. Say, New Harmony, p. 5.

This species seems to be found in a great variety of mammal and bird nests, as prior to 1941 I had only collected one specimen; this was on an old felt hat on the ground at Broomall, Pennsylvania, June 12, 1934. This year I collected between two and three hundred specimens in the nests of crows (*Corvus brachyrchynchos Brehm*), screech owl (*Otus asio naevius* Gmelin), great horned owl (*Bubo virginianus* Gmelin), barn owl (*Tyto alba pratinicola* Bonaparte), tufted titmouse (*Baeolophus bicolor* Linnaeus), hawk (*Buteo* sp.) and gray squirrel (*Sciurus carolinensis* Gmelin). All specimens were collected in Chester or Delaware Counties, Pennsylvania, between May 11 and June 15, 1941. In addition I have seen specimens collected in the nests of turkey vulture (*Cathartes aura septentrionalis* Wied) and the starling (*Sturnus vulgaris* Linnaeus).

TROX AFFINIS Robinson. 1940. Trans. Amer. Ent. Soc. LXVI, p. 158.

At the time I wrote the original description of this form I thought it was a subspecies of *Trox aequalis* Lec. Since then I have examined specimens from New York, Pennsylvania, Maryland, Virginia, Iowa, Kansas and California. While I haven't found any more characters to separate the two species I think the larger size, different male genitalia and lack of intermediate specimens are sufficient to rank it as a separate species.

In addition to the type series of fifty-nine specimens collected in various localities in New Jersey, which were all collected in crows' nests, I have collected twenty-four specimens in four different crows' nests this spring and Dr. Robert M. Stabler collected two specimens in Chester County on May 18, 1941, in a crow's nest. In the great horned owl nest which I examined on June 18, 1941, I collected fifty-two specimens of

this species. I believe the reason for the large number of specimens being found in this Owl's nest is that the owl had used a last years crow's nest as the basis for its own nest and the *Trox*, when they matured this year, started to feed on the hair of rabbits and feathers of pheasants and grouse, which remains were found in the nest.

TROX STRIATUS Melsheimer. 1846. Proc. Acad. Nat. Sci. Phila. II, p. 137.

This species has always been rare in collections and was one of the species I endeavored to trace to a definite host. In the barn owl's nest at Broomall, I took several hundred specimens of *striatus* along with the other *Trox* and *Hister* collected there. In addition I collected it in the nest of a barn owl at Lyndell, Pennsylvania, on June 18, 1941, a great horned owl's nest at Cupola, Pennsylvania, on the same date, and screech owl's nest at Chester Heights, Pennsylvania, also yielded several specimens on June 15, 1941.

Conjointly with the above biological data is the record of Sim's that he collected several specimens in May and June, 1930 at Moorestown, New Jersey, in the nest of a barn owl. All of these records add up to but one conclusion, that *Trox striatus* is found in the nests or nesting cavities of our species. of owls.

TROX LATICOLLIS Leconte. 1854. Proc. Acad. Nat. Sci. Phila. VII, p. 213.

This species was always very rare in collections until Mr. C. A. Frost collected over twenty-five specimens in May, 1939, in a fox den at Natick, Massachusetts. Since then Dr. Milton W. Sanderson sent me four specimens which he found feeding on a dead fox in a cave in Washington County, Arkansas, on November 12, 1938. On July 1, 1941, I took one specimen in the den of a gray fox (*Urocyon cinereoargenteus* Schreber) at the Springton Dam in Delaware County, Pennsylvania.

APHODIUS MANITOBENSIS Brown. 1928. Can. Ent. LX., p. 302.

Mr. Robert Swett presented to me a male specimen of this

species which he collected at Canadensis, Pennsylvania, in March, 1939, in the ground under a pile of white-tailed deer (*Odocoileus virginianus* Boddaert) excrement. At the time that the specimen was collected there was frost in the ground and patches of snow here and there on the surface.

Mr. W. J. Brown, who described the species and compared this specimen with the type stated that this was only the second specimen he had seen.

APHODIUS OBLONGUS Say. 1823. Journ. Acad. Nat. Sci. Phila. III, p. 215.

Four specimens of this rare species were taken by myself at Broomall, Pennsylvania, in two gray squirrel (*Sciurus carolinensis* Gmelin) nests on June 14, 1941. Both nests were in cavities of dead chestnut trees about thirty feet above the ground. They were composed of piles of leaves which were chewed into small pieces. Whether the *Aphodius* were feeding on the decomposing leaves or the squirrel excrement scattered through the nest I was unable to determine.

PHYLLOPHAGA POSTREMA Horn. 1887. Horn, Tran. Amer. Ent. Soc. XIV, p. 233.

This rather rare Melolonthid was taken by myself for the first time in New Jersey at White's Bogs on June 24, 1939. Six specimens were found feeding at night on tupelo (*Nyssa sylvatica* Marsh.), sweet fern (*Myrica asplenifolia* L.) and blueberry (*Vaccinium virgatum* Ait.).

## Tabanidae of Panama (Diptera).

The annual report of the Gorgas Memorial Laboratory, located in Panama City and in three field stations, for 1940, states that Mr. G. B. Fairchild, Junior Entomologist continued work on the Tabanidae of Panama. "A considerable number of species were added to the collections and three papers on the group were prepared. Two additional species were reared from larvae. In February, the services of a reliable native were secured which enabled collections to be made at one spot every two weeks. When a year's collection has been gathered, it will enable us to gain a very fair idea of the seasonal abundance of the various species."

# Current Entomological Literature

**COMPILED BY V. S. L. PATE, L. S. MACKEY and J. W. CADBURY.**

Under the above head it is intended to note papers received at the Academy of Natural Sciences of Philadelphia pertaining to the Entomology of the Americas (North and South), including Arachnida and Myriopoda. Articles irrelevant to American entomology will not be noted; but contributions to anatomy, physiology and embryology of insects, however, whether relating to American or exotic species will be recorded.

This list gives references of the current or preceding year unless otherwise noted. All continued papers, with few exceptions, are recorded only at their first installment.

For records of Economic Literature, see the Experiment Station Record, Office of Experiment Stations, Washington. Also Review of Applied Entomology, Series A, London. For records of papers on Medical Entomology, see Review of Applied Entomology, Series B.

**Note.** References to papers containing new forms or names not so stated in titles are followed by (*); if containing keys are followed by (k); papers pertaining exclusively to neotropical species, and not so indicated in the title, have the symbol (S) at the end of the title of the paper.

**The figures within brackets [ ]** refer to the journal in which the paper appeared, as numbered in the list of Periodicals and Serials published in our January and June issues. This list may be secured from the publisher of **Entomological News** for 10c. The number of, or annual volume, and in some cases the part, heft, &c., the latter **within ( )** follows; then the pagination follows the colon :

**Papers published in the Entomological News are not listed.**

**GENERAL.—Anon.**—Dr. Lee Strong dies in Arizona. [4] *73*: 114-115. **A. W. B.**—Professor Lawson Caesar retires. [4] *73*: 97-98, ill. **Crabb, E. D.**—Abbreviation of names of biological publications. [Univ. Colo. Studies] 1 (D): 177-191. **Davis, J. J.**—Willis Stanley Blatchley. [7] 34: *279-283*, ill. **Fossa-Mancini, E.**—Noticias sobre hallazgos de insectos fosiles en la America del sur. [Notas Mus. de la Plata] 6: 101-140. **Riley, et. al**—Catalogue of the books, manuscripts, maps and drawings in the British Museum (Nat. Hist.). Vol. 8: 969-1480. **Smart, J.**—Instructions for collectors. No. 4A. Insects. [Brit. Mus. Nat. Hist.] 1940: 164 pp., ill. **Torre-Bueno, J. R.**—A useful catalogue. [19] 36: 128. Compendium of entomological methods-Pt. 2. Orthoptera. [19] 36: 136. **Turner, H. J.**—Notes on nomenclature. 1. [21] 53: 63-67. **Williams, E. C.**—An ecological study of the floor fauna of the Panama Rain Forest. [Bull. Chicago Acad. Sci.] 6: 63-124, ill. **Wood, S. F.**—A method of collecting and transporting cone-nosed bugs. [19] 36: 137-139, ill.

**ANATOMY, PHYSIOLOGY, ETC.—Crowell, H. H.**—The utilization of certain nitrogenous and carbohydrate substances by the southern armyworm, Prodenia eridania. [7] 34: 503-512, ill. **Day, M. F.**—Pigment migration in the eyes of the moth, Ephestia kuehniella. [Biol. Bull.] 80: 275-291, ill. **Dethier, V. G.**—The function of the antennal re-

ceptors in lepidopterous larvae. [Biol. Bull.] 80: 403-414, ill. **Evans, J. W.**—Morphology of Tettigareta tomentosa (Cicadid.). [Pro. R. S. Tasmania] 1940: 35-49, ill. **Hardman & Craig.**—A physiological basis for the differential resistance of the two races of red scale to HCN. [68] 94: 187. **Henke & Mertz.**—Ueber die kerngrossenunterschiede im flugelepithel der mehlmotte und ihre beziehungen zur grossendifferenzierung der schuppen. [97] 61: 40-64, ill. **Hungate, R. E.**—Experiments on the nitrogen economy of termites. [7] 34: 467-489. **Kuhn, A.**—Zur entwicklungsphysiologie der schmetterlingsschuppen. [97] 61: 109-147, ill. **Lotmar, R.**—Das mitteldarmepithel der raupe von Tineola bisselliella, insbesondere sein verhalten während der Häutungen. [41] 18: 233-248, ill. **Timofeeff-Ressovsky, H. A.**—Temperaturmodifikabilitat des zeichnungsmusters bei verschiedenen populationen von Epilachna chrysomelina. [97] 61: 68-84, ill. **Vargas, L.**—Detalles morfologicos de los Anopheles americanos del grupo maculipennis y especies proximas. [121] 2: 23-25, ill. Detalles morfologicos poco o nada conocidos de Anopheles mexicanos [121] 2: 66-69, ill. **Vogt, M.**—Anatomie der pupalen Drosophilaringdruse und ihre mutmassliche bedeutung als imaginales metamorphosezentrum. [97] 61: 148-158, ill. See also under Diptera, various authors.

**ARACHNIDA AND MYRIOPODA.—Archer, A. F.**—The Argiopidae or orb-weaving spiders of Alabama. [Geol. Surv. Alabama] Mus. Pap. 14: 77 pp., ill. (*). **Chamberlin, R. V.**—New genera and species of American Lithobiid centipeds. [Bull. Univ. Utah] Biol. Ser. 6: 23 pp. New western Millipeds. [Bull. Univ. Utah] Biol. Ser. 6: 23 pp., ill. **Malkin, B.**—New spider records for New York State. [19] 36: 122. **Marshall, R.**—Preliminary list of the Hydracarina of Wisconsin VI. [Trans. Wisc. Acad. Sci. Arts & Letters] 32: 135-165, ill. (*). **de Mello-Leitao, C.**—Anchocoema ogloblini, nova especie de Proscopiida. [15] 13: 99-102, ill. Notas sobre a sistematica das Aranhas, com descricao de algumas novas especies sul Americanas. [15] 13: 103-127, ill. Aranhas do Parana. [14] 11: 235-257, ill. (*).

**THE SMALLER ORDERS OF INSECTS.—Buxton, P. A.**—Studies on populations of head-lice (Pediculus humanus capitis). [116] 33: 224-242. **Crawford, J. C.**—A new Taeniothrips from Michigan. [10] 43: 142-143. **Leeson, H. S.**—The effect of temperature upon the hatching of the eggs of Pediculus humanus corporis. [116] 33: 243-249.

**Ross, H. H.**—Descriptions and records of North American Trichoptera. [1] 67: 35-126, ill. **Silvestri, F.**—Tre nuove sp. di Machilellus del Brasile. [14] 11: 545-550 ill.

**ORTHOPTERA.—Alexander, G.**—Keys for the identification of Colorado Orthoptera. [Univ. Colo. Studies] 1 (D): 129-164, ill. **Chagnon, G.**—The cockroach Supella supellectilium in Quebec (Blattidae). [4] 73: 104. **Deoras, P. J.**—Structure of Hemimerus deceptus var. ovatus; an external parasite of Cricetomys gambiense. [116] 33: 172-185, ill. **Rehn, J. A. G.**—A new Californian species of Gammarotettix (Gryllacrididae). [Notulae Nat.] No. 85: 4 pp., ill. **Shotwell, R. L.**—Life histories and habits of some grasshoppers of economic importance on the Great Plains. [U. S. Dept. Agric.] Tech. Bull. No. 774: 47 pp., ill.

**HEMIPTERA.—Barber, H. G.**—Descr. of a new bat bug (Cimicid.). [91] 31: 315-317. **de Carlo, J. A.**—Descripcion de tres especies nuevas del genero Cryphocricus. Una nueva especie del genero Heleocoris (Naucoridae). [104] 10: 426-433, ill. **Drake & Harris.**—Concerning some Halobalinids from western Hemisphere (Gerridae). [Iowa Sta. Jour. Sci.] 15: 237-240. (s*). **da Fonseca, J. F.**—Contribuicao para o conhecimento dos membracideos neotropicos III. [14] 11: 133-138 (*). **Harrington, C. D.**—Influence of aphid resistance in peas upon aphid development, reproduction and longevity. [47] 62: 461-466, ill. **Harris & Drake.**—Notes on the family Mesoveliidae with descr. 2 n. sps. [Iowa State Jour. Sci.] 15: 275-277. (s*). **Harris, H. M.**—Concerning Neididae, with new species and new records for North America. [19] 36: 105-109. **Hausman, S. A.**—Leaf-mining insects. [Sci. Monthly] 53: 73-75, ill. **Knight, H. H.**—N. sps. of Lygus from West. U. S. (Miridae). [Iowa State J. Sci.] 15: 269-273. (*). **Knowlton, G. F.**—Studies of western aphids. [Pro. Utah Acad. Sci. Arts & Letters] 18: 41-44. **deLong, D. M.**—The gen. Arundanus in N. Am. (Cicadellid.). [119] 25: 632-643. (*). **Monte, O.**—Tingitideos novos pouco conhecidos da fauna Americana. Notas sobre Gargaphia subpilosa. [14] 11: 283-300, ill.; 301-308, ill., (s*). **Morrison, H.**—A new Steatococcus from Mexico. [10] 43: 140-141. **de Toledo, A. A.**—Notas sobre a biologia do Chrysomphalus aonidum no Estado de S. Paulo, Brasil. [14] 11: 559-78, ill. **de la Torre-Bueno, J. R.**—Remarks on the genus Corizus of authors, not of Fallen. [7] 34: 284-288. (k). **Usinger, R. L.**—The present status and synonymy of some Orsilline species

(Lygaeidae). [19] 36: 129-132.

**LEPIDOPTERA.—Bell, E. L.**—Un nuevo genero y algunas nuevas especies de Hesperides del Peru. [Bol. Mus. Hist. Nat. "Javier Prado"] 5: 208-218, ill., cont. **Ficht, G. A.**—Notes on Indiana Noctuidae. [Proc. Indiana Acad Sci.] 49: 243-253. **Franclemont, J. G.**—Some new noctuids from New York State with notes on other well known species (Phalaenidae). [4] 73: 111-114. **Gaede, M.**—Lepidopterorum Catalogus. Pars 92. Oecophoridae II. 209-476. **Geigy & Zinkernagel.**—Beobachtungen beim aufbau einer technischen grosszucht der kleidermotte (Tineola biselliella). [41] 18: 213-232, ill. **Hoffman, C. C.**—Catalogo sistematico y zoogeografico de los Lepidopteros Mexicanos. [An. Inst. Biol., Mexico] 11: 639-739, ill. **Hovanitz, W.**—The selective value of aestivation and hibernation in a California butterfly [19] 36: 133-136. **Klima, A.**—Lepidopterorum Catalogus. Pars 94. Pyralididae. subfam. Pyraustinae II. 225-384 **Kloet, G. S.**—Experiments on living pupae. [8] 77: 139-140. **Klots, A. B.**—Two European Tortricidae not hitherto recorded from North America. [19] 36: 126-127. **Littlewood, F.**—On rearing Lepidoptera. [9] 74: 88-94, 101-106, 124-130, 161-165, cont. **Lustig, E. F.**—Parasitism in Papaipema purpurifascia. [19] 36: 141. **de Martin, M.**—La coleccion de Lepidopteros del Museo. [Bol. Mus. Hist. Nat. "Javier Prado"] 5: 197-208. **McDunnough, J.**—A new Albertan Olethreutid. [4] 73: 98-99, ill. **Moeck, H. W.**—A butterfly migration in Mexico. [Trans. Wisc. Acad. Sci. Arts & Letters] 32: 113-122. **O'Byrne, H. I.**—Some noteworthy Missouri butterflies: Papilio troilus ab. radiatus and a variation of Lycaenopsis pseudargiolus. [19] 36: 124-125. **Schweizer & Kay.**—Lepidopteros del Uruguay. [An. Mus. Hist. Nat. Montevideo] 5: 14 pp., ill. **Stichel, H.**—Lepidopterorum Catalogus. Pars 93. Nymphalidae III. Subfam. Charaxidinae II. 543-794. **Urquhart, F. A.**—Sulphur and white butterflies. [Canadian Nat.] 1941: 106-107, ill.

**DIPTERA.—Bouvier, G.**—Quelques observations biologiques sur les Tabanidés. [41] 18: 280-285, ill. **Cazier, M. A.**—A generic revision of the fam. Apioceratidae with a revision of the N. A. sps. [119] 25: 589-631. (*). **Champlain, A. B.**—Botflies and game. [Penna. Game News] 1941: 29, ill. **Coe, R. L.**—Callicera rufa (Syrphidae); colour-variation of abdominal hairs in the adult, with a note on long-

evity of the larva. [9] 74: 131-132. **Cregan, M. B.**—Generic relationships of the Dolichopodidae. Based on a study of the mouth parts. [Ill. Biol. Monogr.] 18: 68 pp., ill. **Harmston, & Knowlton.**—Courting antics of a robber fly. [19] 36: 110. **Hull, F. M.**—Some nn. spp. of Syrphidae from South America. [91] 31: 311-315. **Muller, H. J.**—Bibliography on the genetics of Drosophila. [Imp. Bur. Animal Breeding & Genetics] 1939: 132. **Pessoa & Guimaraes**—Nota sobre Streblideos de Morcegos de Matto-grosso, Brasil [14] 11: 421-426, ill. **Philip, C. B.**—Notes on Nearctic Pangoniinae (Tabanid.). [10] 43: 113-130, ill. (*). Notes on Nearctic Tabaninae. Pt. 1. Stenotabanus, Atylotus and Tabanus. [4] 73: 105-110. (*). **Pritchard, A. E.**—Annamyia, a new genus of Asilidae, with a revision of the genus Aphamartania. [10] 43: 131-140, ill. (*). **Rifenburgh, Walker & Johnson.**—Radiation of Drosophila melanogaster with low-intensity ultra-violet light for one complete generation. Effect on crossing-over in the second chromosome of the male. [Proc. Indiana Acad. Sci.] 49: 215-226. **Steyskal, G.**—A curious habit of an Empidid fly. [19] 36: 117, ill. A new species of Euparyphus from Michigan (Stratiomyidae). [19] 36: 123-124. Odontomyia records (Stratiomyid). [19] 36: 125. A new species of Pterodontia (Acroceridae). [19] 36: 140. **Ward, H. L.**—A note on the occurrence of a syrphid larva as an accidental parasite of man. [Proc. Indiana Acad. Sci.] 49: 199-200.

**COLEOPTERA.—Bolivar y Pieltain, C.**—Descripcion de un Trechinae silvicola del Mexico central. [An. Escuela Nac. Cien. Biol. Mexico] 2: 111-118, ill. **Buchanan, L. L.**—A n. sp. of Melamasius from Cuba (Curcul.). [Mem. Soc. Cuba Hist. Nat.] 15: 169-172, ill. **Chapin, E. A.**—Lady beetles belonging to the genus Procula. [Mem. Soc. Cuba Nat. Hist.] 15: 165-168, ill. (s*). **Dahl, R. G.**—Two new southwestern Chrysomelidae with a key to the known varieties of Saxinis saucia. [13] 33: 29-31. **Dillon & Dillon.**—The tribe Monochamini in the Western Hemisphere. (Cerambycidae). [Reading Pub. Mus. & Art Gallery] Scien. Publ. No. 1: 135 pp., ill. **Dodge, H. R.**—Observations on Sandalus niger, its egg, and first instar larva. [7] 34: 458-466, ill. **Fiedler, K.**—Monograph of the South American weevils of the genus Conotrachelus. [Brit. Mus. Nat. Hist.] 1940: 365 pp., ill. (k*). **Frost, C. A.**—Notes on Notiophilus. [19] 36: 127-128. **Hinton, H. E.**—A mono-

graphic revision of the Mexican water beetles of the family Elmidae. [71] 42: 396 pp., ill. (k*). **Lane & Fisher.**—Notes on the Schaeffer types in the families Cebrionidae, Elateridae and Throscidae. [19] 36: 118-122. **Malkin, B.**—A European buprestid in the United States. [19] 36: 132. **Pereira, F. S.**—Pinotus de la Republica Argentina. (Copridae). [106] 131: 262-267, ill. (*). **Rempel & Shevkenek.**—Notes on the morphology, life history, and economic importance of Smicronyx utilis (Curculionid.). [4] 73: 100-104, ill. **Robinson, M.**—Studies in the Scarabaeidae of North America. Pts. 1 and 2. [1] 67: 127-136, ill. (*). **Seevers, C. H.**—Taxonomic investigations of some termitophilous Staphylinidae of the sub-families Aleocharinae and Trichopseniinae (n. subfam.). [7] 34: 318-349, ill. **Williams, R. W.**—Methods of collecting and marking large numbers of beetles. [19] 36: 139-140.

**HYMENOPTERA.—Arajo, R. L.**—Contribuicao para o conhecimento de Gymnopolybia meridionalis. [14] 11: 11-16. **Bequaert, J.**—Two neotropical Polistes imported with bananas. [19] 36: 109. Additions and corrections to the revision of North American Vespinae (Entomologica Americana, 1932). Second Paper. [19] 36: 111-117. **Buren, W. F.**—Lasius (Acanthomyops) plumopilosus, a new ant with plumose hairs, from Iowa. [Iowa State Jour. Sci.] 15: 231-235. **Gemignani, E. V.**—Los tipos de las especies del genero Trypoxylon existentes en el Museo Argentino de Ciencias Naturales. [104] 10: 434-447, ill. **Parkin, E. A.**—Symbiosis in larval Siricidae. [31] 147: 329.

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ATLAS OF THE SCALE INSECTS OF NORTH AMERICA, by GORDON FLOYD FERRIS, Professor of Zoology, Stanford University. Series III, 269-384. Stanford University Press. Published March 27, 1941. Price bound $7.75, unbound $6.75.—In the NEWS for May, 1937, page 150, and for October, 1939, pages 238-239, we have noticed respectively the appearance of Series I and II of this Atlas. The present series continues in the style of its predecessors and is devoted to the Tribes Diaspidini (23 genera, 11 of them new, with 5 previously described and 40 new species) and Aspidiotini (13 genera, 3 of them new, with 26 previously described and 24 new species). Many of the new species are based on material collected by the author in his expedition of 1938 from California to Panama. Members of both the tribes here represented also appeared in the earlier series.—P. P. CALVERT.

BUTTERFLIES. A handbook of the butterflies of the United States, complete for the region North of the Potomac and Ohio Rivers and East of the Dakotas, by RALPH W. MACY and HAROLD H. SHEPARD. Published by the University of Minnesota Press, Minneapolis. 8 vo. Cloth, 247 pp., 4 colored plates and many text illustrations. Price, $3.50.—Dr. Macy is the author of many technical papers on biological subjects, as is Dr. Shepard, as well as the Hesperidae section of the Catalogus Lepidopterorum; the completion of which is unfortunately interrupted by the war.

In the first section the authors give new information about ancient beliefs about butterflies, and curious facts about their life histories and habits. The second section describes the 162 species to be found in N. E. United States and adjoining Canada, with special reference to their occurrence in Minnesota.

The keys, adequate descriptions, and plates and text illusstrations will enable the collector to identify the butterflies that may come to his net. There is included a sufficient amount of references to other more expensive or obscure publications, but this book is indispensible to the amateur as well as the advanced student of these most charming members of the insect world.—R. C. WILLIAMS, Jr.

INSECT PESTS OF STORED GRAIN AND GRAIN PRODUCTS, IDENTIFICATION, HABITS AND METHODS OF CONTROL, by RICHARD T. COTTON, Senior Entomologist, Bureau of Entomology and Plant Quarantine, U. S. Department of Agriculture. 8 vo., photo offset, flexible binding, 242 pp., illus., Minneapolis, Minn., Burgess Publishing Company, 1941, $3.00. —This is a compact, practical handbook prepared for ready reference use of farmers, elevator operators, shippers, millers and all others who are engaged in the storage, shipping and processing of grain, as well as manufacturers and users of pest control supplies. It has been estimated that as a result of their feeding activities, their presence in grain and cereal products and the cost of methods employed to destroy them, this group of insects exacts a toll yearly of at least $300,000,000 in the United States alone. In order intelligently to combat these insects it is essential to possess a knowledge of their life histories, habits and environmental needs. In order to acquaint

the reader with these pests and the most effective methods of controlling them, the subject matter of the book has been arranged in the following subdivisions: The insect pests of stored grain and milled cereals; Controlling stored grain insects on the farm; Control of insects in grain stored in elevators and warehouses; The insect problem in flour mills; Practical control methods in the mill; Protecting flour after manufacture; Fumigants and fumigation; The common fumigants; Flour mill and warehouse fumigation; Fumigation in atmospheric vaults and vacuum chambers; and Heat sterilization in flour mills. Lists of selected references following each of these subdivisions will aid those who desire to pursue study of any of the various phases of its subject matter beyond the scope of this book. The illustrations likewise have been chosen with particular care adequately to supplement or to make clearer the text discussion. In view of the highly practical importance of the whole subject, particularly at this time when a nationwide public defense program is being stressed, it is believed that this book will fill a definite need and will speediy attain a wide usefulness.—J. S.W.

## OBITUARY

The death, on July 17, 1941, of Professor MYRON HARMON SWENK, chairman of the department of entomology of the University of Nebraska since 1919, was announced in *Science* for August 8. He was born at Polo, Illinois, August 8, 1883, and received the A.B. (1907) and A.M. (1908) degrees from the University of Nebraska, with which his professional life was continuously spent. His entomological interests were on the pollination of plants by insects and the taxonomy of bees. He contributed descriptions of a new *Colletes* to volume 15 of the NEWS (1904) and of other species of the same genus to the volume for 1906, and of species of the genus *Anthophora* to that for 1909.—P. P. CALVERT.

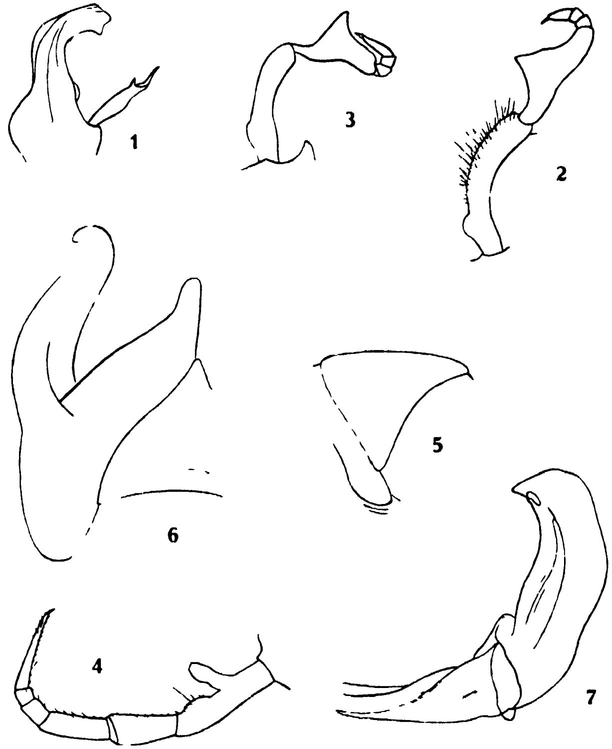


Fig. 1. *Cleidogona nueva*, new species. Right gonopod of male, ectal view.
Fig. 2. The same. Left leg of 9th pair of male, caudal aspect.
Fig. 3. *Cleidogona nueva michoacana*, new variety. Right leg of 9th pair of male, anterior view.
Fig. 4. The same. Left leg of 10th pair of male, caudal view.
Fig. 5. *Eurelus tancitarus*, new species. Collum as seen from the right side.
Fig. 6. The same. Anterior gonopod of left side, anterior view.
Fig. 7. The same. Posterior gonopod of left side, caudal view.

**NEW MEXICAN MILLIPEDS.— CHAMBERLIN.**

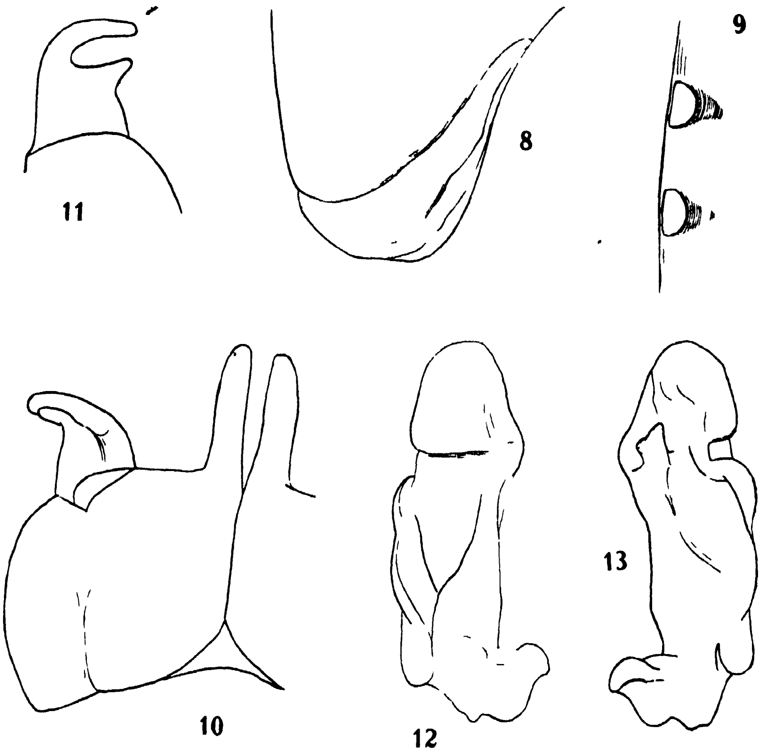


Fig. 8. *Orthoporus leonicus*, new species. Collum as seen from right side.

Fig. 9. *Rhinocricus potosianus*, new species. Scobina of segment in middle section of body.

Fig. 10. *Messicobolus hoogstralli*, new species. Anterior gonopods of male, anterior view.

Fig. 11. The same. Distal end of telopodite of anterior gonopod, caudodorsal view.

Fig. 12. The same. Right gonopod of posterior pair, caudal side.

Fig. 13. The same. Right posterior gonopod, anterior side.

NEW MEXICAN MILLIPEDS—Chamberlin.

# ENTOMOLOGICAL NEWS

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## Samuel Henshaw, 1852-1941. An Appreciation.

Announcement of the death of Samuel Henshaw, on February 5, 1941, was made in the NEWS for March last. Since then two biographical notices of him have appeared: one by his associate in the Museum of Comparative Zoology at Cambridge, the paleontologist, Robert T. Jackson (Science for April 11), the other by two entomologists of the United States Bureau of Entomology and Plant Quaratine, Joseph S. Wade and J. A. Hyslop (Proceedings, Entomological Society of Washington 43: 108-110) To those accounts we can add nothing. Henshaw's reticence concerning himself is illustrated by the brevity of his autobiographical data in *American Men of Science* and in *Who's Who in America*

His positions at the Museum from 1891 to 1927, first as assistant to Dr H. A. Hagen, then as assistant in entomology, curator and director, gave him the opportunity to influence greatly the careers of students of insects. As one of these, I wish to put on record some evidences of appreciation. I made his acquaintance on July 25, 1890, when at the Museum to meet Dr. Hagen. I must have made a favorable impression on him for repeated visits to the M C. Z, enabled me to acquire a knowledge of American Odonata from what was at that time one of the largest collections in the world, certainly in the western hemisphere In 1899, he allowed me to borrow and bring from Cambridge to Philadelphia, an extensive series of neotropical specimens which were utilized in the preparation of the *Biologia Centrali-Americana* and in a contribution to the Neotropical Odonate fauna other than that of Mexico and Central America It is idle to speculate whether my—and others'—opportunities would have been greater or

less had someone else occupied Henshaw's positions. Suffice it to say that I appreciated them then and now, and just as I told him on that cold snowy evening of December 29, 1933, when I last saw him, in his Fayerweather Street house, so now I repeat: I am grateful and I thank him.

PHILIP P. CALVERT.

## Prothetely in Scolytus multistriatus Marsham (Coleop.: Scolytidae).

By RAIMON L. BEARD and PHILIP P. WALLACE.
Connecticut Agricultural Experiment Station,
New Haven, Conn.

Prothetely, or the presence of pupal characteristics in the larval stage, has been reported in several families of Lepidoptera and Coleoptera. Earlier literature covering these reports has been summarized by Thomas (1933).

Since 1933, prothetely has been reported in *Epilachna varivestris (E. corrupta)* by Landis and Davidson (1934), in *Tribolium confusum* by Oosthuizen and Shepard (1936), and in *Melanotus longulus* by Stone (1938).

Observation of several cases of this developmental abnormality among larvae of the elm bark beetle, *Scolytus multistriatus* Marsham, adds a representative of the family Scolytidae to the list of Coleoptera exhibiting this phenomenon.

The larvae of this beetle are typically scolytoid in form and do not normally possess legs. The pupal stage of the insect is preceded by a short prepupal period which is characterized by an enlargement of the thoracic region, with the presence of bulbous structures indicative of the future legs. The prothetely observed is chiefly marked by the presence of legs which are readily distinguished from these prepupal protuberances.

The specimen showing the greatest development of "pupal" characteristics possessed both legs and wing pads. The legs were conspicuous, having the shape illustrated in Figure 1, B.

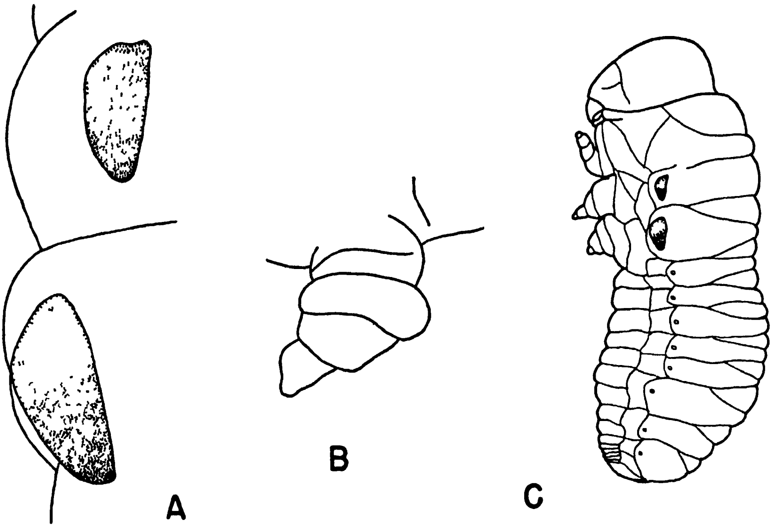


Fig. 1. Prothetely in *S. multistriatus*. A. Dorsal aspect of lateral region of mesonotum, showing position and relative size of wing pads. B. Outline of leg. C. Outline, drawn to scale, of prothetelous larva.

Although the legs had a jointed appearance, there was no evidence of their having any functional significance. The two pairs of wing pads were sclerotized, the posterior pair being somewhat better developed The wing pads (Fig. 1. A) were flattened sacs, appearing to evaginate from the lateral region of the mesonotum and metanotum. It is presumed that this larva, when found, was in the penultimate stadium, as it molted once and later succumbed (probably from desiccation), when it showed evidence of approaching the prepupal condition.

Another specimen, found in the last larval instar, had legs developed almost as well as the one just described, but only the posterior pair of wing pads was evident. This individual pupated and reached the imaginal stage with no apparent difficulties. The adult form did not appear abnormal in any way, indicating that the presence of premature legs and rudimentary wings had no obvious effect upon the viability of the insect.

Approximately twelve other larvae were observed to bear the abnormality in degrees varying from the above two to larvae possessing slight conical protuberances suggestive of leg structures. No confusion, however, arose between these and the protuberances which characterize the prepupal stage.

In only three cases were wing pads present.

An estimated one fourth of one percent of the beetle larvae showed the abnormality, as the number of larvae examined carefully enough to detect the legs approximated 5,000.

Pruthi (1927) believed that in certain Tenebrionids a combination of larval and pupal characteristics indicated a condition of inhibited metamorphosis to which he applied the term neoteny. There is no doubt that the cases here reported for *S. multistriatus* are conditions of prothetely, as the possession of legs and wing pads was noted in the larval instar preceding the definitive prepupal and pupal stages.

In most cases on record (vide Thomas 1933) prothetely has not been observed on material taken in nature, but on experimental material subjected to unusual environmental conditions. Moreover, such a morphological abnormality has generally prevented normal development. It is of particular interest to note, then, that these prothetelous larvae of *S. multistriatus* were taken from infested elm bark exposed to natural conditions and that of the two most extreme cases, one molted as a larva without difficulty, and the other pupated and developed into an apparently normal adult beetle.

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# District of Columbia Butterfly Notes (Lepidoptera : Rhopalocera).

By WARREN HERBERT WAGNER, JR., Washington, D. C.

(Continued from page 200.)

EUREMA JUCUNDA Boisduval and Leconte. I took an old but unbroken male on alfalfa flowers in the Soldiers Home Grounds on July 24, 1935. Mr. Carroll Wood told me that every year specimens are found at Salem, Virginia, so perhaps this butterfly can be expected to reach Washington regularly and therefore should be regarded as a rare visitor.

PIERIS PROTODICE Boisduval and LeConte. A distinctive autumn form occurred in the District region in 1934-35-36. Similar specimens are found in other localities according to Dr. George W. Rawson. The shape is nearest that of the summer form, but the chalky white color of the wings and dark markings underneath are closer to the spring form.

PAPILIO AJAX Linnaeus. In the spring a small, light form occurs just as in all of the other swallowtails. It is found in the last half of April and early May and is characterized by the greater amount of yellow relative to the black ground color. The row of spots nearest the outer edge is larger and the females have more yellow in the inner row than in the summer form. There is more hair on the bodies of both sexes.

P. PALAMEDES Drury. On July 31, 1937, I saw an unmistakable *palamedes* near Chillum Heights in Washington from a distance of about 200 feet. Even at this distance the lumbering flight and checkered appearance make it easily recognizable. I caught up with it but unfortunately "muffed" it. It was a fresh specimen. A previous storm may account for its presence so far from its native swamps.

P. MARCELLUS Boisduval. Intermediates between the late-spring and the summer forms are found occasionally in late May. A fresh one at hand taken by Mr. Wayne K. Hill is a female and intermediate in every respect.

RHABDOIDES CELLUS (Boisduval and LeConte.) This butterfly is a permanent resident here, reappearing every year in the locality near Great Falls, Maryland, discovered by Mr. and

Mrs. Clark.

ERYNNIS ZARUCCO Lucas. This species was taken for the first time when a mated pair was captured July 12, 1935, in the Soldiers Home Grounds. They were identified by Foster H. Benjamin as *zarucco* (*terentious*). It is probably more common along the Chesapeake Bay Region of Maryland east of Washington.

STAPHYLUS HAYHURSTII (Edwards). Although it does not occur in the original Washington area, this skipper is quite common at Camp Letts, Maryland, just twenty-nine miles away. It is found along paths in woods and the edges of woods bordering on old fields and salt marshes.

HESPERIA METEA (Scudder). Mr. and Mrs. Clark have this skipper from nearby in Virginia. It is not uncommon in the Catholic University Grounds in Washington wherever there are dry grassy fields interspersed with pines. My earliest date is April 25, 1938, when three fresh specimens of both sexes were taken. My latest capture was May 29. It is extremely inconspicuous and hard to catch.

POLITES MANATAAQUA (Scudder). Before 1932, this skipper was apparently rare but since that time it has been abundant. May 25, 1936, is my earliest date and it disappears around the end of June appearing again toward the end of July. I took a gynandromorph in field east of 16th Street, N. W., near the District line. A common tendency among the males is to lose the orange-yellow markings above the stigma, making the specimens almost completely melanic. Some of these have been confused with *Atrytone vestris,* but the stigma shape and the presence of light tan scaling on the underside of the hind wings in *manataaqua,* which is absent from *A. vestris,* enable easy identification usually.

ATRYTONOPSIS HIANNA (Scudder). The same localities that yield *H. metea* also yield *hianna* in much greater quantities. *Hianna* emerges later than *metea*—my earliest date is May 5, 1938—and it can be found until the first week in June. It rarely visits flowers but when it does this skipper is usually

found on blackberry blossoms. The height of the season is the middle of May when fifty or so can be taken in a morning: mated pairs are most common at this time. *Hianna* is occasional in several other places in and around Washington.

The specimen captured August 26, 1939, by Mr. Clark and listed as this species has since been found to be *Lerema accius*. *Hianna* has but one brood.

LERODEA EUFALA (Edwards). A single male was taken September 7, 1935, in a flower bed in MacMillan Park. It should be regarded as a very rare visitor here late in the summer.

POANES ZABULON (Boisduval and LeConte). This common skipper has two broods here instead of one. My records show that it disappears toward the end of June and reappears the last week in July and flies until September.

P. MASSASOIT HUGHI Clark. Another bog where this butterfly is abundant was located at Hyattsville, Maryland. Both the Beltsville, Maryland Bog and that at Hyattsville are being destroyed in their natural flora and fauna by "improvements." In 1936, this butterfly appeared as early as June 25. The form of this subspecies, corresponding to *suffusa* of typical *massasoit*, is frequent in both sexes and has the yellow-orange patch on the underside of the hind wings evenly covered over with dark rusty brown. *Poanes massasoit hughi* may conceivably disappear from our area as did *P. aaroni* and *viator*.

P. VIATOR (Edwards). This is a common skipper in and near salt marshes around Camp Letts and along the Patuxent River at Benedict, in Maryland, but I doubt if it now occurs normally much nearer to Washington. My earliest and latest dates are June 20 and September 7. There are at least two broods.

P. AARONI Skinner. The above named localities for *viator* also yield this skipper, but in smaller numbers. *Aaroni* wanders quite far away from its supposed home at Camp Letts, Maryland. In fact all but one taken there were found in an old field a quarter-mile from the nearest salt marsh. On June 20, 1939, Dr. George W. Rawson and I took more than a dozen

of both sexes in this field. There are two broods; the first is from the second week in June to the first week in July and the second from the third week in August to at least the second week in September. Many specimens, both Mr. Clark and Mr. Williams agree, approach in size and color the subspecies *howardi* from Florida. Although this interesting skipper has been often reported from the Eastern shore of Maryland, I believe these records are the first from the Western shore side of Maryland.

PANOQUINA OCOLA (Edwards). I have taken this butterfly in Washington from August 4 to September 23. It is rare here and the only female I have ever seen here was on the Chain Bridge Flats along the Potomac River. Held between two fingers, a male will slowly rotate its antennae after the curious fashion of *Ancyloxypha numitor* when at rest, as described by Mr. Scudder, and *Atrytone logan* held between the fingers, as described by Mr. Clark.

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(gynandromorph), and *Calpodes ethlius* recorded from the District of Columbia area.]

ID. Butterflies from Virginia. Proc. Biol. Soc. Washington, vol. 52, pp. 177-184, Dec. 15, 1939. [*Poanes aaroni* recorded from Washington.]

# A New Race of Vespula squamosa (Drury), from Michoacan, Mexico (Hymenoptera, Vespidae).

By J. BEQUAERT, Museum of Comparative Zoölogy, Cambridge, Massachusetts.

The small collection of Vespidae made in Mexico last summer by Mr. Harry Hoogstraal and Mr. Kenneth Knight was recently acquired by the Museum of Comparative Zoölogy. It contains an interesting local race of *Vespula* (*Vespula*) *squamosa* (Drury), the first to be known of that species.

**Vespula squamosa** var. (or subsp.) **michoacana**, new.

*Worker.*—Black, with the following yellow markings: clypeus, except for a median longitudinal spot in upper two-thirds; inner orbits, filling the ocular sinuses but not reaching the vertex; a large, lozange-shaped spot above insertion of antennae, very narrowly divided from the inner orbits; outer orbits covering the entire genae and extending over hind part of vertex, but narrowly interrupted behind the ocelli; most of mandibles; scape beneath; broad hind margin of pronotum, narrowed and widely interrupted medially; two narrow, slightly curved, median, longitudinal stripes on mesonotum; a basal transverse band, broadly interrupted on scutellum, very narrowly divided on postscutellum; a small spot on each side of propodeum; a large spot in upper corner of mesepisternum; a small spot in upper corner of metapleura; tegulae; most of legs (often somewhat orange and the femora extensively infuscate); hind margins of all tergites and sternites, continued along the sides, narrow and uniform on tergites 1 and 6, much wider and with wavy anterior margin on tergites 2 to 5, very extensive and with lateral black spots on sternites 2 to 5.

In addition tergite 1 bears on the edge of the slope a narrow transverse band which does not reach the sides and is interrupted medially; the disk of tergite 2 is either entirely black or bears a narrow cross-band (sometimes mere traces of it)

which does not reach the sides and is interrupted medially. Under side of flagellum somewhat russet, particularly toward the tip. Wing as in typical *squamosa*. The yellow color is sulphur-yellow on head and thorax, slightly tinged with orange on abdomen.

*Holotype,* worker, and eight *paratypes* (workers), Tancitaro, 6600 ft., State of Michoacan, Mexico, July, 1940 (H. Hoogstraal and K. Knight). Mus. Comp. Zoöl., Cambridge, Mass. Paratypes also at Academy of Natural Sciences, Philadelphia, U. S. Nat. Museum and American Mus. of Natural History, New York.

It seems reasonable to assume that the curious reduction of the color markings of the abdomen is caused by the mountain climate. In the many workers of *V. squamosa* I have seen from the eastern United States and other parts of Mexico (Mexico City; Puebla; Hidalgo; Chihuahua), the discal transverse bands of tergites 1 and 2 are broad, connected with the yellow sides and not or very narrowly interrupted in the middle; the yellow markings of propodeum and mesopleura are also more extensive.

## Seven New Millipeds from Mexico (Chilopoda).

By RALPH V. CHAMBERLIN, University of Utah, Salt Lake City.

(Plates III and IV.)

The seven species of diplopods described as new in the present paper are based upon material collected by Harry Hoogstraal and Kenneth Knight, chiefly in June and July, 1940, on the "Third Hoogstraal Mexican Biological Expedition." Some specimens, however, as hereafter noted, were taken in June, 1938. All types are at present deposited at the University of Utah.

Order CHORDEUMIDA.

Suborder CHORDEUMOIDEA.

Family PSEUDOCLEIDIDAE.

**Cleidogona nueva** new species (Figs. 1, 2).

A blackish band across the dorsum of each metazonite en-

closing four light spots in transverse series, from each of which arises a seta, the lateral spot on each side more elongate; prozonite also with cross band of black embracing at middle two contiguous or sub-contiguous light spots and large lateral light area on each side more extensive than the corresponding spot on metazonite. A longitudinal dark band along the upper part of each side just below line of keels while the lower part of side is pale, the line of junction between dark and light deeply remote. Legs somewhat dusky white, darker distally. Antennae dark.

Eyes large, triangular with apex ectad, ocelli numerous and distinct, arranged in 6 or 7 series much as in *michoacana.*

Antennae slender, with articles of usual proportions, the seventh more slender and scarcely longer than the sixth.

Distinguished from *michoacana* in the form of gonopods and adjacent legs as shown in figs. 1 and 2.

Length 12-13 mm.

Locality.—NUEVO LEON: Sabinas Hidalgo; Ojo de Agua. One male taken on June 14, 1940, in decaying wood outside of a cave at an elevation of 1300 feet by K. Knight.

A lighter colored form than *C. nueva michoacana* from which it differs superficially also in color pattern; e. g., in having the pair of submedian dorsal light spots on prozonites which are wholly lacking in *michoacana.*

**Cleidogona nueva michoacana** new variety (Figs. 3, 4).

A black band along dorsum and a similar one along each side with upper border at or just below level of pores; on each side between dorsal and lateral dark stripes a longitudinal yellow stripe with irregular margins and the sides also light colored below lateral dark bands; the two more median setae on each segment each inserted on a small circular yellow spot; anal tergite black. Legs dusky yellow.

Eyes large and black, composed of numerous ocelli arranged in series from above below as follows: 7, 7, 7, 5, 5, 3, 1. Antennae long and slender, with the articles of the typical relative proportions.

Carinae weak, and setigerous tubercles slight.

Gonopods close to those of *nueva,* but the dorsal tooth on the basal spur appears lower and less acute.

Ninth legs of male as shown in fig. 3. Tenth legs of male as shown in fig. 4. Process of eleventh legs nearly the same as those of the tenth.

Length, about 13 mm.

Locality.—MICHOACAN: Tancitaro. Elevation, 6,500 feet. Under logs in damp ground. A male and female taken by Hoogstraal, July 22, 1940.

Order JULIDA.

Suborder SPIROSTREPTOIDEA.

Family SPIROSTREPTIDAE.

**Orthoporus leonicus** new species (Fig. 8).

Brown, the segments with a lighter ferruginous annulus about the caudal border and lighter brown anteriorly adjacent to each preceding segment. Legs brown of a somewhat ferruginous cast.

Head and collum smooth. Collum with form and characteristic lateral sulci as shown in fig. 8. Segmental encircling sulcus on ordinary somites deeply impressed throughout, widely and moderately excurved opposite the pore which is separated from it by about twice its diameter; longitudinal striae deep and complete up to the level of pore, above which they are abbreviated and are not present across dorsum; the metazonites appearing smooth but under the lens revealing numerous very fine punctae and slight anastomosing ridges. Last tergite with caudal portion sharply set off by transverse depression from anterior part, exceeded by the valves. Anal valves smooth, their inner borders compressed and strongly elevated.

Number of segments in female holotype, 72. In female paratypes 69 and 73 respectively.

Length, near 160 mm.; width, 9.5 mm. The two younger female paratypes are respectively 5.5 and 7.5 mm. in diameter.

Locality.—NUEVO LEON: Ojo de Agua, Sabinas Hidalgo. Elevation 1500 feet. Under damp rock near a stream. Three females taken by Harry Hoogstraal, June 18, 1938.

This is a larger, more robust form than other species heretofore reported from Mexico, apparently also quite distinct in sculpturing of collum and other segments.

Suborder SPIROBOLOIDEA.

Family RHINOCRICIDAE.

**Rhinocricus potosianus** new species (Fig. 9).

Olive to olive brown, the caudal borders of segments deeper

in color. Antennae and legs brown.

Head smooth and shining; median sulcus distinct below level of antennae, but obscure across vertex.

Collum with ends widely rounded; surface smooth and shining; a fine margining sulcus about the anterior corner on each side.

Second tergite extended well below level of the collum where its anterior border is thickened and elevated. On ordinary segments the median sulcus is distinct throughout, interrupted with impressed cross lines or punctae; slightly angled at level of pore with which it is in contact; surface above smooth and shining. Scobina beginning on ninth or tenth segment, where weak and small, and continuing to about the fiftieth where they again gradually fade out. In the segments of the middle region the scobina are deeply impressed with the striae very fine and close-set, the deep lunate areas separated by somewhat less than twice their width. See further fig. 9.

Number of segments in female holotype, 60.

Length, 108 mm.; diameter, 8.8 mm.

Locality.—SAN LUIS POTOSI: Valles, 7 miles south of El Banito. Elevation, 100 feet. Under bark of fallen tree. One female taken by Hoogstraal and Knight, June 26, 1940.

In general structure possibly near to *R. aurocinctus* of Durango, but strikingly different in coloration. The scobina in form and distance apart seem distinctive.

Family SPIROBOLIDAE.

**Spirobolus nigrior** new species.

Deep blackish brown, nearly uniform in color. Antennae and legs also blackish.

Eyes large, ocelli distinct, about 50-55 in number; arranged in 6 series. Clypeal foveolae 4 + 4.

Collum of usual general form; surface mostly smooth; a sharply defined anterior margining sulcus from level of eye to lower caudal corner; just above and subparallel with the margining sulcus a short stria running from caudal margin forward.

Second tergite extending well below level of the collum. On ordinary tergites the primary sulcus less sharply impressed across dorsum than the one in front of it. Posterior area of segments with numerous punctae; anterior ring marked with numerous fine short curved striae; striae on sides fine but

distinct, present to level of pores. Caudal triangular portion of last tergite depressed below level of anterior portion, somewhat roughened, the anterior area smooth and shining. Anal valves with borders strongly compressed and elevated.

Number of segments, 53.

Length of female holotype, about 72 mm.; width, 7 mm. The largest paratype is 8.2 mm. in thickness.

Locality.—NUEVO LEON: Villa Santiago (Hacienda Vista Hermosa—Horsetail Falls). On arid plateau at elevation of 2500 ft. One female taken by Hoogstraal and Knight on June 18, 1938. Ojo de Agua, Sabinas Hidalgo; twelve females taken under damp rocks near stream, elevation 1500 ft., by Hoogstraal on June 12, 1938.

In large size of eyes apparently differing from other known Mexican species excepting *S. platyops* Pocock from Mescala. It is, however, conspicuously different from that form in lacking yellow posterior borders to the segments, etc.

**Messicobolus hoogstralli** new species (Figs. 10-13).

Brown, in part of chestnut cast, the somites darker on sides adjacent to preceding segment. Legs light brown. Antennae somewhat chestnut brown.

Antennae obviously compressed, lying in a wide groove down side of head in front of eye and forward in mandible at side of clypeal region. Clypeal foveolae 4+4.

Collum narrowly rounded at ends; with a submarginal sulcus extending from level of eye to lower end on each side; surface smooth and shining. Second tergite produced well below level of collum; four longitudinal sulci above lower margin. On typical segments the pore lies its diameter or more in front of the segmental suture; a supplementary sulcus branches off from the suture above the level of the pore and parallels the primary suture across dorsum. Metazonites appearing smooth and shining above but under the lens showing numerous but not dense fine punctae and short impressed lines; sides longitudinally striate below level of pore.

Gonopods of male as shown in figs. 10, 11, 12, and 13.

Number of segments 48-49.

Length of male holotype, about 100 mm.; diameter, 11 mm. Diameter of female allotype, 13 mm.

Locality.—NUEVO LEON: Sabinas Hidalgo, Ojo de Agua.

Five males and one female taken by Harry Hoogstraal, June 14, 1940, under damp rocks near a stream. "Arid semi-desert."

A larger form than *M. godmani* (Pocock) with 48-49 segments as against 42, distinct also in the form of the male gonopods.

Family ATOPETHOLIDAE.

**Eurelus tancitarus** new species (Figs. 5-7).

The male holotype is brown with the caudal borders of somites darker. Legs and antennae brown. Some of the associated females vary to chestnut, but the dark annuli about borders of segments are conspicuous in all.

Antennae slender as usual. Ocelli 28-30 in each patch, arranged in 6 series, the eyes widely separated.

Collum smooth and shining; at ends narrowly rounded as shown in fig. 5. Second tergite extending much below end of collum, its lower posterior corner widely rounded as shown in the figure. Segmental sulcus single, distinct throughout. Pore contiguous with segmental sulcus; a short deep longitudinal sulcus behind middle at level of pore. Longitudinal striae numerous and fine beneath but not reaching level of pore by a wide distance. Surface not punctate.

In the male the claws of the first two pairs of legs enlarged. The processes of coxae of third legs much smaller than in other known species and the coxae of immediately following legs scarcely compressed and with processes obsolete.

The gonopods of the male also distinctive among the known species. See figs. 6 and 7.

Number of segments in male holotype, 43. In females, 41-42.

Length of male holotype about 35 mm.; diameter, 4.5 mm. Females up to 60 mm. long and 8 mm. in diameter.

Locality.—MICHOACAN: Tancitaro. On soil under rocks in moist woods. One male (holotype) and ten females taken by Hoogstraal on July 20, 1940.

In the reduced size of coxal processes in the male *E. kerrensis* forms a transition to the present species. *E. tancitarus* is clearly distinct from other known species also in the characters of the male gonopods.

# Cockroaches: The Forerunners of Termites (Orthoptera: Blattidae; Isoptera).

By Phil Rau, Kirkwood, Missouri.

The termites show a very close structural relationship to cockroaches; they are, however, much more recent in geological time, having made their appearance during the age of Reptiles, whereas the cockroaches are known to be among the oldest of insects. There is little doubt, says Imms[1] that the Isoptera rose from cockroach-like forms and "subsequently developed a complex social organization." In observing cockroaches intimately for a number of years I am inclined to believe that termites did not subsequently develope a complex social organization, as Imms says, but that many of the features of social behavior which they possess were handed down to them from their ancestors, the cockroaches. Certain characteristics of termite behavior were already evident in cockroaches long before termites came upon the earth, and my attention was especially attracted to this problem when I found two species of domiciliary cockroaches mixing bits of wood, grains of sand, fecal pellets, or chunks of soil with the glutinous secretions of the mouth and applying the mixture to egg-cases, thereby completely disguising them.[2] Now termites have the habit of using similar mixtures for nest building and nest repairing and since this habit was evidently inherited from the cockroaches I thought perhaps that the gathering of additional data on how other species of cockroaches treat the egg-cases would throw some phylogenetic light on the subject.

I found that the two species alluded to, *Blatta orientalis* and *Periplaneta americana,* glue bits of surrounding material to the egg-case; *Periplaneta australasiae*[3] also covers the egg-case

[1] Recent advances in Entomology; p. 85, 86, 1931.

[2] Ent. News 51: 186-187, 1940; also article soon to appear in Annals Ent. Soc. Amer.

[3] Rau, Jungle Bees and Wasps of Barro Colorado Island P. 196, 1933.

in the same way. Two species of wood-roaches in Missouri, *Parcoblatta virginica* (unrecorded observation) and *Parcoblatta pennsylvanica* (Ent. News 51: 6, 1940) do not cover the egg-cases but drop them as they are in galleries in rotten wood or under loose bark. The wood-eating roach, *Cryptocercus punctulatus*[4] cuts a groove in the wood, deposits the egg-case and seals it up so completely, that only one end is visible.

In the German cockroach, *Blattella germanica,* the period of incubation is much reduced, and also the egg-cases are carried for a longer time; the result is that often an egg-case gives forth its young while it is still being carried about by the mother[5]. The hatching of the eggs while the egg-purse is protruding from the mother's body is apparently a step toward the viviparous habit in cockroaches, and we have in the species *Panchlora viridis* an example of a cockroach that gives birth to its young alive; of *P. viridis* Sharp says (Insects, Pt. 1, 229, 1895) the egg-case is either wanting or present only in a very imperfect form.

We may note that the examples given thus far show the tendency of cockroaches to cover the egg-cases, to seal them up in a groove, to drop them loosely without cover, to carry them about until the eggs hatch from the protruding egg-case, and lastly to dispensing entirely with the egg-case in the viviparous species. Dispensing with the egg-case and dropping the eggs singly is the usual method of oviposition in termites; but even this method was anticipated by the cockroach for Gould and Deay[5] (p. 5) find that, during the latter part of their lives, the females of the American cockroach often "deposit eggs entirely unprotected by any trace of a capsule", and also there are indications that certain fossil Blattidae of Carboniferous did not make egg-capsules, but deposited the eggs singly in trees (Sharp, loc. cit., p. 239). While these two

[4] Cleveland, Mem. Amer. Acad. Arts and Sci. 17: (2) 185-342, 1934.

[5] Gould and Deay, Bull. 451, Purdue Univ. Agri. Exp. Station pp. 15-16, 1940.

unusual examples are very similar to the habit of termites in depositing their eggs singly, we have on the other hand a habit of oviposition in certain primitive termites, *Mastotermes darwininiensis,* which resembles very much the egg-laying habits of cockroaches. Snyder[6] states that this species has an egg-mass similar to the egg-capsule of cockroaches, "the individual termite eggs are firmly cemented together by a light brown gelatinous secretion which fills the insterstices between the eggs." The fact that *M. darwiniensis* is a primitive species makes its egg-laying habits all the more interesting as a connecting link to the cockroach.

There are other patterns in cockroach behavior which parallel termite behaviour or anticipate it; for example, Snyder tells us that in the wings of certain primitive cockroaches, a break occurs similar to the humeral suture or line of weakness near the base of the termite wing, where the wing breaks off after the colonizing flight. He also tells us that the large wingless brown roach, *Cryptoccrus punctulatus* leads a sub-social life in partly decayed logs, where the wood serves both as shelter and food. And finally, as if flying directly into the arms of termite behavior, we have a cockroach—an Australian species belonging to the genus *Panesthia*—[7] which "lives in burrows in the soil in strict family communities, each of which consists of an adult male, a viviparous female, and from ten to twenty of their larval progeny in various stages of growth, * * * * * and soon after reaching maturity the adults bite off their own tegmina and wings, for these organs are inconvenient for inhabiting the burrow"—and this, I may say in passing, is about as far as a cockroach may dare go—without actually becoming a termite.

To conclude then, this little review indicates that cockroach behavior in many of its aspects is the forerunner of termite

[6] Our Enemy the Termite, pp. 16-17, 1935.

[7] Tillyard, Insects of Australia and New Zealand, p. 92, 1926.

behavior and that the termites themselves are not responsible for the development of all of the complex traits of their social behavior—but much of it has been handed down to them from their Blattoid ancestors. This outline, however, is suggestive rather than exhaustive and future research will, I am sure, supply many of the connecting links and strengthen many of the weak places in the phylogenetic scheme.

I may mention in passing, Dr. Wheeler's contention[8] that the historical and comparative method "still has much to offer in the study of behavior, although it has fallen into undeserved disuse, and even disrepute among laboratory biologists."

INSECT PESTS OF FARM, GARDEN AND ORCHARD. By LEONARD M. PEAIRS. New York, John Wiley & Sons, Inc., 1941. $4.00.—In 1912, Dr. E. Dwight Sanderson published the first edition of this work, which met with such well deserved success that he, with the coauthorship of Dr. Peairs, had to revise it for two more editions. The present edition is the fourth and from which, as coauthor, Dr. Sanderson had to withdraw. Although the general format of the former editions has been retained in the present one the subject matter is presented in a much improved manner, making a more com--prehensive work, better serving the purpose for which it is published, i. e., as a text book for agriculturists and students of economic entomology. The contents are divided into chapters on: 1, Structure and Development; 2, Classification; 3-5, Control: climatic, biological, mechanical, cultural and chemical; 6-19, Insects injurious to various crops and fruits; with the last two on insects injurious to stored products and on those injurious to man and domestic animals. It contains 523 pages including the index, and 648 illustrations. The illustrations, with few exceptions are good and satisfactorily delineate the subjects. On the whole, a work that should find a useful place on the desk of all economic entomologists and should be a valuable consulting work for the practical agriculturist.—E. T. CRESSON.

[8] Essays in Philosophical Biology, p. 52, 1939.

# Current Entomological Literature

COMPILED BY L. S. MACKEY and R. G. SCHMIEDER.

Under the above head it is intended to note papers received at the Academy of Natural Sciences of Philadelphia pertaining to the Entomology of the Americas (North and South), including Arachnida and Myriopoda. Articles irrelevant to American entomology will not be noted; but contributions to anatomy, physiology and embryology of insects, however, whether relating to American or exotic species will be recorded.

This list gives references of the current or preceding year unless otherwise noted. All continued papers, with few exceptions, are recorded only at their first installment.

For records of Economic Literature, see the Experiment Station Record, Office of Experiment Stations, Washington. Also Review of Applied Entomology, Series A, London. For records of papers on Medical Entomology, see Review of Applied Entomology, Series B.

**Note.** References to papers containing new forms or names not so stated in titles are followed by (*); if containing keys are followed by (k); papers pertaining exclusively to neotropical species, and not so indicated in the title, have the symbol (S) at the end of the title of the paper.

**The figures within brackets [ ]** refer to the journal in which the paper appeared, as numbered in the list of Periodicals and Serials published in our January and June issues. This list may be secured from the publisher of **Entomological News** for 10c. The number of, or annual volume, and in some cases the part, heft, &c., the latter within ( ) follows; then the pagination follows the colon :

**Papers published in the Entomological News are not listed.**

**GENERAL.—Abbott, C. E.**—The sensory basis of courtship. [6] 49: 217-220. **Anon.** Arthur Paul Jacot. [39] 24: 43-47. **Balch, R. E.**—The climate of the Maritime Provinces. [4] 73: 139. **Bates, M.**—Laboratory observations on the sexual behavior of anopheline mosquitos. [42] 86: 153-174. **Bruch, C.**—Miscelaneas entomologicas. [Notas Mus. de la Plata] 6: 157-171, ill. **Buxton, P. A.**—A map projection of biological interest. [107] 16: 34, ill. **Chamberlin, W. J.**—Entomological Nomenclature and Literature. Michigan. 1941. 103 pp. **deLeon, D.**—Some observations on Forest Entomology in Puerto Rico. [Caribbean Forester] 2: 160-163. **Diakonoff, A.**—Het paramount-kaart-systeem ten dienste van de entomologie. [102] 7: 34-40. **Essig, E. O.**—Bibliography of entomological publications of Charles William Woodworth. [12] 34: 595-596. Itinerary of Lord Walsingham in California and Oregon, 1871-1872. [55] 17: 97-113, ill. **Fichter, E.**—Apparatus for the comparison of soil surface Arthropod populations. [84] 22: 338-339, ill. **Grier, M. C.**—Oceanography of the North Pacific Ocean, Bering Sea and Bering Strait: a contribution toward a bibliography. [Univ. Washington Publ.] 2: 160. **Hatch, M. H.**—The logical basis of the species concept. [90] 75: 193-212. **Hickin, N. E.**—Methods used in rearing small insects infesting stored food products. [107] 16: 35-38, ill. **Hovanitz, W.**—Parallel ecogenotypical color variation in butterflies. [84] 22: 259-284, ill. **Porter, L. C.**—

What kinds of light attract night flying insects most? Least? [General Electric Rev.] 44: 310-313, ill. **Snapp, O. I.**—History of the cotton states branch of the American Association of Economic Entomologists. [12] 34: 485-490. **Wade, J. S.**—Obituary Lee Abram Strong. [12] 34: 479-480, ill. **Whelan, D. B.**—The role of plastics in the field of entomology. [103] 14: 73-84. **Young, F. N.**—A correction. [39] 24: 31.

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**ANATOMY, PHYSIOLOGY, ETC.**—**Bodenstein, D.**—Investigations on the problem of metamorphosis. VII. Further studies on the determination of the facet number in Drosophila [42] 86: 87-112. VIII. Leg determination 87: 31-54. **Brehme, K. S.**—The growth of transplanted minute and wild-type optic disks in Drosophila melanogaster [Growth] 5: 183-196. **Caspari, E.**—The influence of low temperature on the pupation of Ephestia kühniella. Z. [42] 321-332. **Classey, E. W.**—The Breck: an excerpt from a lepidopterist's diary, with notes on light. [9] 74: 171-173. **Day, M. F.**—Pigment migration in the eyes of the moth, Ephestia kühniella Z. [92] 80: 275-291, ill. **Dethier, V. G.**—The function of the antennal receptors in lepidopterous larvae. [92] 80: 403-414, ill. Chemical factors determining the choice of food plants by Papilio larvae [90] 75: 61-75. **Gjullin, Hegarty & Bollen.**—The necessity of a low oxygen concentration for the hatching of Aedes mosquito eggs. [Jour. Cell. & Comp. Physiol.] 17: 193-202. **Hinton, H. E.**—Notes on the internal anatomy and immature stages of Mucetophagus quadripustulatus (Mycetophagid.). [107] 16: 39-48, ill. **Krogh & Zeuthen**—The mechanism of flight preparation in some insects. [Jour. Exp. Biol.] 18: 1-10. **Kühn, A.**—Zur Entwicklungsphysiologie der Schmetterlingsschuppen. [97] 61: 109-147, ill. **Pearl, Park & Miner.**—Experimental studies on the duration of life. XVI. Life tables for the flour beetle Tribolium confusum D. [90] 75: 5-19. **Rosenblad, L. E.**—Description of ejaculatory sac diverticula in certain Drosophilinae. [90] 75: 285-288 ill. **Schneider, B. A.**—The nutritional requirements of Tribolium confusum Duval [92] 80: 208-227. **Stanley, J.**—A mathematical theory of the growth of populations of the flour beetle Tribolium confusum Duv. IV. [84] 22: 23-37. **Stern, C.**—The growth of testes in Drosophila. I. The relation between vas deferens and testis in various species. II. The nature of interspecific differences [42] 87: 113-159.

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**THE SMALLER ORDERS OF INSECTS.—Banks, N.**—Some new and interesting Neuroptera in the American Museum of Natural History. [40] No. 1143: 5 pp. **Berner, L.**—Ovoviviparous mayflies in Florida. [39] 24: 32-34. **Holway, R. T.**—Tube-building habits of the eastern subterranean termite. [12] 34: 389-394, ill. **Ide, F. P.**—Mayflies of two tropical genera, Lachlania and Campsurus, from Canada with descriptions. [4] 73: 153-156. (*). **MacLeod & Craufurd-Benson.**—Observations on natural populations of the body louse, Pediculus humanus corporis. [116] 33: 278-299, ill. **Nutman, S. R.**—Function of the ventral tube in Onychiurus armatus (Collembola). [31] 148: 168-169.

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pers by the chorionic sculpturing. [Kansas Agric. Exp. Sta.] Tech. Bull. No. 48: 39 pp., ill. **Urquhart, F. A.**—The species of Nemobius in Ontario. [Can. Field Nat.] 55: 80-82. (k). **Watson, J. R.**—Migrations and food preferences of the lubberly locust. [39] 24: 40-42. **Zeuner, F. E.**—The classification of the Decticinae hitherto included in Platycleis or Metrioptera. [36] 91: 50 pp., ill. (*).

**HEMIPTERA.**—**China, W. E.**—Genotype fixations in Hemiptera Heteroptera. [107] 10: 130. **Doering, K. C.**—A revision of two genera of North American Cercopidae. [103] 14: 102-108, cont. (k). **Drake, C. J.**—Three new American Tingitidae. [55] 17: 139-141. **Gorham, R. P.**—An early record of aphid flight. [4] 73: 136. **Islas, F.**—Desarrollo y caracteres morfologicos de Triatoma picturata. [112] 12: 311-326, ill. **Pelaez, D.**—Estudios sobre Membracidos. [112] 12: 327-344, ill. [Rev. Soc. Mexicana Hist. Nat.] 2: 51-67, ill. **Sailer, R. I.**—A new species of Thyreocorine from Mexico. [103] 14: 90-91, ill. **de la Torre-Bueno, J. R.**—A synopsis of the Hemiptera-Heteroptera of America North of Mexico. [70] 21: 41-122. (k). **Usinger, R. L.**—The genus Oechalia (Pentatomidae) [37] 11: 59-93, ill. A remarkable immigrant Leptopodid in California. [19] 36: 164-165. **Wood, S. F.**—Notes on the distribution and habits of reduviid vectors of Chagas' disease in the southwest United States. (Reduviid.). [55] 17: 115-118.

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rhopalocera of British Guiana. [Brit. Guiana Dept. Agric.] Ent. Bull. No. 3: 88 pp., ill. **Hoffmann, C. C.**—Lepidopteros nuevos de Mexico. [112] 12: 231-235, ill. Catalogo de los Lepidopteros mexicanos. [112] 12: 237-294. **Hovanitz, W.**—(See under General.) **Kühn, A.**—(See under Anatomy.) **Marsh, F. L.**—A few life history details of Samia cecropia within the southwestern limits of Chicago. [84] 22: 331, ill. **Martin & Houser.**—Numbers of Heliothis armigera and two other moths captured at light traps. [12] 34: 555-559, ill. **Richards, A. G., Jr.**—The genus Arugisa in the United States, with the description of a new species (Phalaenid.). [40] No. 1114: 4 pp., ill. **Tilden & Mansfield.**—Some observations and captures of California lepidoptera. [55] 17: 113-114, cont. **Vazquez, L.**—Estudio monografico de las Psychidae de Mexico. [112] 12: 295-310, ill. (*).

**DIPTERA.—Alexander, C. P.**—New or little-known Tipulidae Neotropical species. [75] 8: 105-132, ill. **Ayroza-Galvão & Coutinho.**—Contribuição ao estudo dos Flebótomos do estado de São Paulo, Phlebotomus sallesi no. sp. (Psichodid.). [Arq. Hig. e Saude Publ.] 5: 15-27, ill **Bates, M.**—(See under General.) **Bigham, J. T.**—Hippelates (eye gnat) investigations in the southeastern states. [12] 34: 439-444. **Bohart, G. E.**—A review of the genus Physocephala of the western United States. (Conopid.) [55] 17: 141-144. **Coutinho, J. O.**—Observações sôbre algumas espécies de flebótomus com a descrição do Macho de Phlebotomus lloydi-Antunes, 1937. [Arq. Hig. e Saude Publ.] 5: 31-41, ill. **Curran, C. H.**—Some new species of Mallophora (Asilidae). [6] 49: 269-284. New American Syrphidae. [62] 78: 243-304. (k). New neotropical Tachinidae. [40] No. 1113: 5 pp. (k). **Harmston & Knowlton.**—New species of Hercostomus from western North America (Dolichopodid). [4] 73: 127-132, ill. New western Dolichopodidae. [103] 14: 92-97, ill. **Hull, F. M.**—Some new species of Syrphidae. [19] 36: 166-168. **Mallis & Pence.**—The Pacific drain fly in homes. [12] 34: 586, ill. **Philip, C. B.**—Notes on nearctic Tabaninae, Part II. Tabanus and Hybomitra. [4] 73: 142-153. **Richards, A. G., Jr.**—Differentiation between toxic and suffocating effects of petroleum oils on larvae of the house mosquito (Culex pipiens). [1] 67: 161-196, ill **da Silva Ramos & Unti.**—Notas sôbre os anofelinos de São Vicente e suas imedações. [Arq. Hig. e Saude Publ.] 5: 53-

58, ill. **Simmons & Dove.**—Breeding places of the stable-fly or "Dog Fly" Stomoxys calcitrans in northwestern Florida. [12] 34: 457-462. **Snyder, F. M.**—Contribution to a revision of neotropical Mydaeini. [40] No. 1134: 22 pp. (k*). **Vargas, L.**—Anopheles pseudopunctipennis willardi n. var. (Culicid.). [Rev. Soc. Mexicana Hist. Nat.] 2: 47-49. Simulium lane-portoi n. n. y lista de simúlidos mexicanos [Rev. Inst. Salubrid. y Enferm. Trop.] 2: 115-122. Aplicación taxonómica de un método estadístico. [Rev. Inst. Salubrid. y Enferm. Trop.] 2: 123-128, ill. **Webber, R. T.**—Synopsis of the Tachinid flies of the genus Tachinomyia, with descriptions of new species. [50] 90: 287-303. (k).

**COLEOPTERA.—Baker, W. C.**—Type of wood preferred by Coleoptera commonly found in decadent parts of living elm trees. [12] 34: 475-476. **Balthasar, V.**—Eine reihe von neuen coprophagen Scarabaeiden. [2] 37: 84-93. **Banninger, M.**—Bestimmungstabelle der sudamerikanischen formen des subg. Taeniolobus (Carab.). [2] 37: 65-78. **Barr, W. F.**—New distributional records of Paratyndaris (Buprestid.). [19] 36: 168-169. **Bianchi, F. A.**—Remarkable longevity of a Pyrophorus larva. [37] 11: 38-39. **Blackwelder, R. E.**—A monograph of the genus Trigonurus (Staphylinid.). [40] No. 1124: 13 pp. **Bryson, H. R.**—The occurrence in Kansas of the sugar-cane rootstock weevil, Anacentrinus deplantus (Curculionid.). [103] 14: 84-90, ill. **Calhoun, P. W.**—Topping cotton in early fall as a possible means of reducing the spring boll weevil population in the northwestern part of the Florida Sea Island Cotton Belt. [39] 24: 35-40. **Chamberlin & Seaton.**—Proportion of the sexes in June beetles in Wisconsin. [12] 34: 467. **Fender, D.**—Notes on Cantharis (Cantharid.). [55] 17: 126-129, ill. **Heikertinger & Csiki.**—Coleopterorum Catalogus. Pars 166. Chrysomelidae: Halticinae. 336 pp. **Hinton, H. E.**—A monographic revision of the Mexican water beetles of the family Elmidae. [71] 42: 217-396, ill. A synopsis of the American specie of Austrolimnius (Elmidae). [8] 77: 156-163, ill. (k*s). **Kleine, R.**—Genera Insectorum. Fasc. 207. Coleoptera Fam. Brenthidae. 197 pp., ill. **Lane, M. C.**—Three new Elateridae from the Pacific northwest. [55] 17: 133-139, ill. **Leech, H. B.**—Descriptions of two new species of water beetles of the genus Hydroporus from California. (Dytiscid.). [55] 17: 129-132, ill. **Malkin, B.**—Triachus vacuus. [19] 36: 183. Additions to New Jersey State List

of Coleoptera. [6] 49: 285-291. **Pieltain, C. B.**—Estudio de un Trechus alpino nuevo del Nevado de Toluca, Mexico. [Rev. Soc. Mexicana Hist. Nat.] 2: 39-46, ill. **Pierce, W. D.**—A Strepsipterous parasite of a leaf hopper, with descriptions of related species from the same host genus. [38] 40: 1-10, ill. (*). **Pinckney & Stitt.**—Tests of species and varieties of vetch for resistance to the vetch bruchid. [U. S. Dept. Agric.] Circ. No. 617: 5 pp. **Reinhard, H. J.**—The life history of Phyllophaga tristis and allied forms. [12] 34: 526-532. **Saylor, L. W.**—Five new Guatemalan scarab beetles of the genus Phyllophaga. [91] 31: 384-388. **Schenkling, S.**—Coleopterorum Catalogus. Pars 170. Index generalis. 502 pp. **Schenkling & Marshall.**—Coleopterorum Catalogus Pars. 168. Curculionidae: Addenda. 14 pp. **Thomas, C. A.**—The Elateridae of Pennsylvania. [6] 49: 233-263. **Timoféeff-Ressovsky, H. A.**—See under Anat. Oct.) **Voss, E.**—Coleopterotum Catalogus. Pars 167. Curculionidae: Rhynchitinae II, Allocoryninae, Pterocolinae. 57-130 pp. **White, B. E.**—A new Nodonota with a key to the United States species (Chrysomelid.). [19] 36: 162-164. **Williams, R. W.**—Notes on the bionomics of the milkweed beetle Tetraopes tetrophthalmus. [14] 73: 137-139. **Young, F. N.**—Bidessus rogersi, new water beetle from Florida. [39] 24: 29-31, ill.

**HYMENOPTERA.—Banks, N.**—A partition of our Cryptochilus, with some new Psammocharidae. [4] 73: 119-122, ill. **Bequaert, J.**—Pseudodynerus, a neotropical complex of Eumenine wasps (Vespid.). [40] No. 1106: 10 pp., ill. (k*). **Blanchard, E. E.**—Una especie nueva de Apanteles Parasito de Melittia bergi. [Notas Mus. de la Plata] 6: 153-155, ill. **Bugbee, E. E.**—A new species of the Eurytoma rhois complex from the seeds of Schmaltzia trilobata (Eurytomid.) [103] 14: 98-102, ill. **Gahan, A. B.**—A revision of the chalcid-flies of the genus Monodontomerus in the United States National Museum. [50] 90: 461-482. **Hetrick, L. A.**—Life history studies of Neodiprion americanum. [12] 34: 373-377, ill. **Lafleur, L. J.**—Civil disturbances in ant communities. [6] 49: 225-231. **Michener, C. D.**—A synopsis of the genus Trachusa with notes on the nesting habits of T. perdita. (Megachilid.). [55] 17: 119-125. **Niblett, M.**—Notes on the Cynipid genera Cynips, Biorhiza and Megaptera. [9] 74: 153-157. **Pate, V. S. L.**—Two new species of sphecoid wasps from Trinidad. [Notulae Naturae] No. 91: 8 pp. **Richards, O. W.**—The classifica-

tion of the genus Mischocyttarus (Vespid.). [107] 10: 124-130. (k*). **Weber, N. A.**—Notes on the effect of drouth upon the nesting habits of ants. [4] 73: 140-141.

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GENERIC RELATIONSHIPS OF THE DOLICHOPODIDAE (Diptera), BASED ON A STUDY OF THE MOUTH PARTS, by Sister MARY BERTHA CREGAN, R. S. M., Illinois Biological Monographs, Vol. XVIII, No. 1. The University of Illinois Press, Urbana, Illinois, 1941. Pp. 37, 30 plates , 193 figs. $1.00—In her paper of the above title the author has proposed a generic arrangement of the American Dolichopodidae. Object of the study was, to quote, "To ascertain if the groupings of the American genera on the basis of mouthparts would conform to those of Langhoffer." Mouthpart structure was the basis upon which Langhoffer established a generic arrangement in the Old World Dolichopodidae. In addition to her own conclusions, the author gives a very "meaty" summarization of studies and observations made by earlier entomologists on the food habits, characteristics and habitats of this family. Four distinct types of mouthparts were found to occur among the thirty-two genera studied. They have been designated by Sister Cregan as: (1) the labralate type; (2) the epipharyngeal two-prong type; (3) the epipharyngeal four-prong type; and (4) the epipharyngeal plate type. The 193 freehand drawings illustrate both complete mouth units and individual structures in the various genera studied. Commonly used entomological terms are employed throughout. Mouthparts were prepared for study by being run through the potassium hydroxide, water, alcohol, xylol and glycerine series. The four main types are further divided, on the basis of structural characteristics in the epipharyngeal armature and pseudotrachea, into twelve groups of genera, which, as the author states, "may be considered as subfamilies although not so named here." The author has ascribed real importance to trophi structure as a means for generic classification, whereas, with the exception of Langhoffer, other systematists of the Dolichopodidae apparently gave little consideration to such structures. The phylogenetic arrangement of genera into subfamilies as proposed by Sister Cregan does not, in several instances, agree with the earlier system of Langhoffer, which likewise was based upon mouthpart structure, nor with those of Aldrich, Becker and Lundbeck, which were based upon external characters. In passing it should be noted, however, that in respect to many

genera the earlier classifications do not agree among themselves. Regardless of the value which different investigators may attach to Sister Cregan's classification, her paper should prove to be a valuable reference for anyone contemplating a comprehensive study of Diptera mouthparts.—FRED C. HARMSTON.

## OBITUARY

Postamtmann i: R. M. P. RIEDEL died on March 27, 1941, following a long illness, at Frankfurt am Oder, Germany. He was born on February 19, 1870, and was thus in his 72nd year. Riedel was a distinguished student of the Diptera, particularly of the Tipulidae, having published numerous papers on the Australian, Oriental, Ethiopian, Neotropical and western Palaearctic faunas. He is survived by his widow, Margarete Weidefeld Riedel, and a daughter, Gertrud Riedel Kloeckner. The words "Postamtmann i. R." preceding the name refer to his being a retired officer of the German Postal Service.—C. P. ALEXANDER.

*Science* for July 4, 1941, announced the death of ALEXANDRE ARSÉNE GIRAULT in the hospital at Brisbane, Queensland, Australia, on May 2. He was born at Annapolis, Maryland, January 9, 1884, received the B.S. degree from Virginia Polytechnic Institute in 1903, was a special field agent of the U. S. Department of Agriculture, 1904-07, and was connected with the office of the State Entomologist of Illinois, 1908-11. He contributed many articles to the NEWS from 1900 to 1918, especially in 1913-1918. Many of these dealt with the parasitic Hymenoptera, especially the Chalcioidea, but there were many observations on the life histories and biology of various insects. Two of his early papers were bibliographies of entomological glossaries (1905). A series of ten Standards of the number of eggs laid by insects, being averages obtained by actual count of the combined eggs from 20 depositions or masses, ran from 1901 to 1914; references to volume and page numbers will be found in volume 25, page 296. Another series of three dealt with the number of eggs laid by spiders (1911-1914, vols. 22,

24, 25).

A note in the NEWS for October, 1911 (page 373) announces his appointment as entomologist of the Department of Agriculture of Queensland, and his papers from October of that year to January, 1915, are from Brisbane or from Nelson (Cairns). That of February, 1915, was sent from Washington, but in 1916, he removed to Glenndale, Maryland, where he was when the last of his NEWS papers (1918) appeared. Subsequently he returned to Australia.—P. P. CALVERT.

Prof. CHARLES BRANCH WILSON died on August 18, 1941, according to *Science* for August 29. He was born at Exeter, Maine, October 20, 1861, and received the degrees of A.B. (1881) and A.M. (1883) from Colby College and Ph.D. (1910) from Johns Hopkins University. He was head of the department of Science at the Massachusetts State Teachers College at Westfield, 1897-1932, since which time he was emeritus lecturer there. *American Men of Science,* from which we have taken many of these data, gives a fairly long list of the groups of animals he studied, many of them in connection with the United States Bureau of Fisheries. The only insects mentioned are water beetles and dragonflies. His papers on the latter deal with those of the Mississippi Valley (the Mississippi River from St. Paul to Cairo, Illinois, the Ohio from Cairo to Paducah, Kentucky, and the Tennessee from Paducah to Riverton, Alabama: Proc. U. S. N. M. 36, 1909), the Cumberland Valley in Kentucky and Tennessee (Proc. U. S. N. M. 43, 1912) and Jamaica (Johns Hopkins Univ. Circ., Feb., 1911). A more extensive paper, abounding in ecological and developmental data, is that on dragonflies and damselflies in relation to pondfish culture with a list of those found near Fairport, Iowa (Bull. Bur. Fisheries 36, 1920). This was reviewed and criticised by Prof J. G. Needham in the NEWS for January, 1921 (pp. 30-31). A later paper on the macroplankton of Lake Erie (Bull. Buffalo Soc. Nat. Sci. 14, 1929) contains a very brief reference to insects.

No papers by Wilson are listed in the bibliographies in

Leng's Catalogue of the Coleoptera of America north of Mexico, or in the four supplements thereto.

My personal acquaintance with Prof. Wilson was limited to an impromptu dinner of odonatologists at the Harvard Club, Boston, December 28, 1922, arranged by the late Dr. R. Heber Howe, in connection with the American Association for the Advancement of Science meeting. I omitted to make a record of all those who were present.—P. P. CALVERT.

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Prof. ELLISON ADGER SMYTH, Jr., died on August 19, according to a note in *Science* for August 29. From biographical notices in *Who's Who in America* and in *American Men of Science* (fuller in the former), we learn that he was born in Summerton, South Carolina, October 26, 1863, received the A. B. (1884) and the A. M. (1887) from Princeton and the honorary LL.D., from the University of Alabama in 1906. He was adjunct professor of biology at the University of South Carolina, 1889-91 and professor of biology at the Virginia Polytechnic Institute at, Blacksburg, 1891-1925, when he retired. A. A. Girault, whose death we also announce in this issue, must have come in contact with him there. We recall Prof. Smyth as a not infrequent visitor to the late Dr. Henry Skinner, at the Academy of Natural Sciences of Philadelphia, in the eighteen nineties and the early nineteen hundreds, drawn by a common interest in the Lepidoptera. He contributed eighteen papers and notes to the volumes of the NEWS for 1895, 1899-1904, 1907, 1908, 1912, and 1916. They are concerned with the butterflies, sphingids, Catocalae and *Dynastes tityus* of Montgomery County, Virginia, within which Blacksburg lies, butterflies and *Allorhina* of South Carolina, life histories of sphingids and descriptions of two new species from Mexico, a sphinx, *Philampelus elisa,* and a *Morpho* (*thoosa*). In the NEWS for May, 1908, he figured and briefly described "Two Freaks:—Papilio ajax and Eudamus tityrus." Nearly twenty years later, the latter was "christened" *Epargyreus tityrus* aberration *smythi* by R. C. Williams, Jr. (Transactions, American Entomological Society 53: 262. 1927).

P. P. CALVERT.

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# Notes on the Bionomics of Ataxia hubbardi Fisher in Illinois (Coleop.: Cerambycidae).*

By R. W. WILLIAMS, University of Illinois.†

*Ataxia hubbardi* seems to have reached Illinois but recently. Through correspondence, the United States National Museum informs me this species had not previously been found as far north and east as Illinois. Moreover the Illinois Natural History Survey has no collection records of its occurrence in this State. Because Fisher (1924) lists its range as Arizona, Texas, Oklahoma, Nebraska, and Kansas, and I found it only in plants growing along an east-west railroad, it quite probably came here via railroad traffic from the west.

In the locality of Urbana, Illinois, the larvae and pupae develop in the petioles of the large basal leaves of Prairie Dock, *Silphium terebinthinaceum* Jacq. The first adult was found within the petiole of a leaf on June 4, 1940. Although fully developed in hardness and color it had not started to make an exit hole. Another section of petiole was found on the same day in which a circular hole had been gnawed, and through which the adult had apparently escaped. Later many more such stems were found.

Near the point where the leaf blade joins the petiole of *Silphium*, small circular holes about 1.5 mm. in diameter were found. These holes appeared to be too regular and too small to have been made by the adult beetle. It would seem, therefore, that the eggs were deposited upon, rather than in the host stalk, and the larvae upon hatching bored into the petiole. This is the procedure of the closely related species *Ataxia crypta* (*Say*) (Morgan 1907).

* Contribution No. 217 from the Entomological Laboratories of the University of Illinois.

† Now at Cornell University.

Assuming the eggs are deposited on the stems, the larvae, upon hatching, bore into them just below the epidermis and turning towards the base eat downward for an inch or more. They then turn back and eat upwards about the same distance past their entrance holes. The larvae traverse back and forth several times over a period of several days or possibly several weeks. The epidermis of the petioles turns black in these regions. As they become larger the larvae leave the sub-epidermal region and burrow into the pith at the center of the stalk. Here they bore up the mid-rib of the leaf to a point near its tip, a distance of about twelve to fifteen inches. After turning around they come down the mid-rib to a point several inches below the base of the leaf blade. The passage in the mid-rib is filled with frass.

At various distances below the leaf blade the mature larvae girdle the petioles from within. The fallen leaves may be noted lying on the ground about the third week in September. Although all the leaves of this Rosin weed die in the fall and are strewn about over the ground, it is very easy to recognize those which are infested. The factor by which they can be recognized at a distance is the break in the mid-rib at about the middle of the leaf blade. Although all the leaves have a tendency to curl, only the infested stalks break at this point. This break does not appear until after the leaves have begun to dry out. The second recognition mark is the presence of the small circular hole near the base of the leaf blade through which the larva entered the stalk. The smooth girdled end of the stalk, plugged with frass, is a third recognition mark. Although the larvae are not always found in this section of the stalk above the girdle, which bears the blade, the basal portion of the petiole can usually be found within a radius of a few inches from the leaf blade. Rarely was more than one larva found within a stalk and never more than two. When two were present, one was in the section of petiole above the girdle while the other was in the lower section. The girdled end is plugged up with frass so that a closed chamber results in which the larvae overwinter.

Several pupae were found on May 28. These emerged as adults on June 8, indicating that the length of the pupal stage is at least twelve days, perhaps nearer to fourteen. The last pupa was found on June 19. This was the only individual found in the stem of Indian Hemp, *Apocynum cannabinum* L.

## SUMMARY.

1. There is one generation a year in the locality of Urbana, Illinois.
2. The newly transformed adults remain two or three days within the stalks of the basal leaves of *Silphium terebinthinaceum* before emerging, and began to appear during the first week in June.
3. The egg is apparently laid upon the outer surface of the petioles.
4. Upon hatching the larvae presumably bore into the pith, where they feed at first just under the epidermis, then in the pith the entire length of the stalk.
5. The mature larvae form the overwintering stage in this area of the insect's distribution.
6. Pupation begins during the last week in May and the pupal stage has a duration of about fourteen days.

## BIBLIOGRAPHY.

FISHER, W. S. 1924. A New Species of *Ataxia* from the United States. Canadian Ent., Vol. 56, No. 10, pp. 253-254.

MORGAN, A. C. 1907. The Cotton Stalk Borer (*Ataxia crypta Say*). U. S. Dept. of Agr. Division of Ent. Bull., 63, Part 7, pp. 63-66.

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**The Insect Collection of Thaddeus W. Harris (1795-1856)** Was transferred (as a deposit) from the New England Museum of Natural History to the Museum of Comparative Zoology in April, 1941, and placed in the Leconte-Fall Room, together with Harris's notebook and certain M. S. lists and data. This is probably the oldest existing general collection of North American insects. Many specimens are broken or damaged by old Dermestid work (some Orthoptera were completely destroyed long ago), but the bulk of the material is in fair condition considering its age. There was no damage during the transfer to the M. C. Z. The collection contains types of probably at least 200 insects, including numerous Coleoptera, described by Say, Harris, and others.—P. J. DARLINGTON, JR. in Annual Rept. of the Director of the M. C. Z. at Harvard College for 1940-41, pp. 16-17. 1941.

# A Migratory Flight of Phoebis agarithe Bd. (Lepid.: Pieridae).

By Kenneth L. Knight, University of Illinois, Urbana.

Two extensive migratory flights of this species were observed* in June, 1940, in the state of Nuevo Leon, Mexico. Specimens captured from one of these flights were identified by Mr. W. D. Field of the Bureau of Entomology and Plant Quarantine as *Phoebis agarithe maxima* Neum. The white female specimens were further designated as the form *albarithe* Brown. Brown[1] reports this subspecies and form as occurring in the region bordering the Gulf of Mexico from Florida to Southern Mexico with possible extensions into the isthmus of Central America. There are no migration records in the literature for this species.

The flight from which the specimens were captured was observed on the morning of June 23rd in a lime orchard at Hacienda Vista Hermosa, two or three miles southwest of Villa Santiago near the slopes of the Sierra Madre Oriental range. The flight was first noticed at about 9:00 A. M. and was progressing from east to west. The sky was cloudless, and there was a slight breeze blowing from the east. The butterflies were traveling at various heights up to about one hundred feet above the ground. There was a wide belt of them flying through the grove and up over the ridge at the western end of the valley.

Twenty-two specimens were captured from this flight. Fourteen of this number were the white female form and the remaining eight were males of the orange subspecies, a sex ratio of 64 per cent females to 36 per cent males. There were a few cloudless yellows in the ranks, but none of them were captured.

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*Entomologist, The Third Hoogstraal Mexican Biological Expedition, June-September, 1940.

[1] Brown, F. Martin, 1929. A revision of the genus *Phoebis* (Lepid.) *Amer. Mus. Nov.* 368, 32 pp, 37 figs,

Since the path of the flight was so near the ground, many of the butterflies would turn aside a moment to the flowers, but then almost immediately return to the migrating stream. A few Pierids could be seen flying near the ground in directions other than that of the main flight. The flight lasted for about three hours. It stopped with the advent of noon and the dropping away of the breeze. All but two of the specimens captured were quite perfect.

The other flight was observed at 11:00 on the morning of June 22nd at Las Adjuntas, a tiny settlement about fifteen miles southwest of Villa Santiago in the mountains. No specimens were captured, but there were white, orange and yellow Pierids in the flight. They were in about the same ratio of abundance to one another as in the first flight described. This fact, coupled with the nearness of the locality and the similarity of conditions, would tend to indicate that the same species occurred here as in the other migration.

At 11:00 when the flight was first noticed, the butterflies were going along with a steady, swift flight in a northwesterly direction and were apparently riding the strong breeze blowing from the southeast, for when the breeze died away at noon, the flight stopped. In twelve minutes, six hundred butterflies were counted as they passed a point directly overhead, an average of fifty per minute. The lowest butterflies were just clearing the pine trees and were probably thirty feet high. From that elevation, there were butterflies traveling as high as one could see, which was at least a thousand feet, for the high sun illuminated their white or yellow wings in brilliant contrast to the cloudless blue sky. The butterflies were traveling at such different levels that counting was very difficul.t None of them ever faltered to come to earth, and there were no Pierids flying at ground level.

## Prof. Funkhouser on a Collecting Trip.

The undersigned is leaving on a collecting trip in South America, Central America and Mexico and will not return until July 1, 1942. After that date the address will be as usual. W. D. FUNKHOUSER, University of Kentucky, Lexington, Kentucky.

## What is Pseudomechanitis? (Lepid: Nymphalidae).

By Wm. T. M. Forbes, Cornell University,
Ithaca, New York.

In Fox's generic revision of the Ithomiinae[1], the only nominal genus not recognized is *Pseudomechanitis* Röber. The original figure is so vague, being apparently from a pencil sketch or wash drawing rather than from the butterfly itself, and the description is so incomplete in many important points, that any identification must be considered not quite certain until the type is examined.

But we have a male specimen, collected at R. Aguacatal, West Colombia, that comes from near enough to the type locality, and which in pattern fits as closely to the original figure as any real butterfly might be expected to. It is determined by Fassl as *Ceratinia dionaea limpida,* a form described from the Cauca Valley, and fits well enough also to that description. It is a true *Ceratinia,* both superficially and in genitalia, and so far as I can see differs only in minor pattern features from the well known *C. mergelana,* which the Fassl collection contains in series from Muzo, East Colombia. The true *C. dionaea* is quite distinct, and much more heavily scaled. I therefore propose the following disposal of *Pseudomechanitis paradoxa* Röber.

Ceratinia auct., Hübner in part (syn. *Pseudomechanitis* Röber).

mergelana Hew.[2]

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[1] Trans. Am. Ent. Soc. lxvi, 205, 1940.

[2] Fox indicates that so far as it is based on Jones' figure, the name of *P. H. Lycaste* Fabr. belongs to this species, and is specifically based on a very dark female of the *megalopolis* race. Since the name of *lycaste* has been universally used for more than half a century for a member of the *iphianassa* group of *Ithomia,* and generally for *I. panamensis,* I prefer to keep to an unambiguous name. The leading references are: Fabricius, Ent. Syst. iii (1) 161, 1793; Holland, Moth Book (1931 Ed.) pl. 72, fig. 2, publishing Jones' figure from the ms. plate of his "Icones",—the "fig. pict." of Fabricius; Fox, Ent. News l, 141, 1939, with discussion and fuller references. Fabricius' type from the Drury via the Milne collection is presumably in the British Museum, but has not been examined in modern times; Butler silently assumes it is identical with the Jones figure.

M. MERGELANA (East Colombia).

M. LIMPIDA Hsch. (Cauca Valley).

M. PARADOXA Röber (West Colombia).

While by strict interpretation of the code under the type fixation clause, *Ceratinia* would not be available in this place, it was in fact available when it came in use, under the then current elimination codes and practices, and should certainly be kept in the sense of more than fifty years unchallenged use, —as a conservandum even if we accept the validity of the *ex post facto* features of the present code.

## Migrating Butterflies, Libythea bachmanii larvata Stkr., in Texas. (Lepid.: Nymphalidae).

On a Texas highway in the hot Rio Grande valley, as we drove south from Edinburg to McAllen on July 2, 1940, we encountered hundreds of thousands of snout butterflies (identified by Mr. H. I. O'Byrne as *Libythea bachmanii larvata*) as they crossed the road in migratory flight. They flew 3 to 6 feet above ground. They did not come in a continuous cloud, but in either droves or streams which we cut through intermittently. While most of the droves passed over the highway eastward, a few of them moved in the opposite direction. These swarms appeared every mile or two, with frequent stragglers between. All that were examined had frayed wings. Those in flight did not go around our car, but flew over the top or through the open windows. Likewise they persistently went over the roof of a garage toward the southwest, instead of going around it, for an hour while we watched them.

As a digression from their mass flight in a bee-line against the wind, occasionally two or three or half a dozen would whirl and flutter playfully around each other in a small circle, as if in courtship, and gently drift back with the wind, forgetting for the moment the serious business of going somewhere.

This is not the first record of the migration of the snout butterfly, for Mr. C. B. Williams states in the National Geographic Magazine (May 1937, p. 571) that *Libythea bachmanii* has been seen several times in enormous migrations in Texas, usually in August and September. One of these flights was said to extend over a front of 250 miles, and one and a quarter million butterflies passed per minute on the whole front.

"These flights are usually moving toward the east or southeast, but nothing is known of their origin or destination." Again he says (Ann. Ent. Soc. Amer. 31: 236, 1938), "Of the recorded flights in Texas, all except two were to the S. E. quarter, the two exceptions being toward the north."—PHIL RAU, Kirkwood, Missouri.

## Some New Species of Syrphidae from Florida, Cuba and Brazil (Diptera).

By FRANK M. HULL, University of Mississippi.

In this paper I present the description of four new Syrphid flies. Types are in the author's collection.

**Volucella florida** n. sp.

Closely related to *picta* Wied., it is much larger, the prescutellar spot is double, the middle wing blotch is larger and longer, with a clear sinus; the pteropleural pile is yellow, the basi tarsi are orange-red instead of yellow. The pale spots of the venter are much smaller and do not reach the lateral margins. There is much black pile in the posterior corners of the third segment, almost none in *picta*.

♂. Length 9.5 mm. Head: vertex shining black with black pile, behind which on the occiput are a few silvery hairs. The ocular pile is dense, long and very dark brown. The front and face are light cream-yellow with pale yellow pile; the latter has a median, black, brown-bordered stripe running down to the epistoma where it connects with a similar and wider cheek stripe from eye to epistoma. The posterior part of the cheeks and lower occiput are dark brown. The antennae are elongate, the first two joints light brown, the third joint dark, greyish-brown but little less wide at apex than at base. The arista is pale yellow with fifteen black rays above.

Thorax: mesonotum shining black, the notapleurae, humeri, a pair of rounded spots just before the scutellum, a short sublateral vittae behind the transverse suture and the extreme lateral margin behind the suture as well as a large spot on the upper part of the mesopleurae and the propleurae are light yellow. The pile of the dorsum is light yellow in front and again just before the scutellum and narrowly along the sides and over the post calli, but is broadly black over the posterior

part of the mesonotum; this pile is quite long and thick. There is a conspicuous tuft of long, light, shining yellow pile on the mesopleurae, some on the pteropleurae, upper part of sternopleurae and the propleurae. The scutellum is light translucent clayish-yellow; the long, erect pile of the basal half is light yellow; the equally long dense pile of the posterior half and margin is black.

Abdomen: broad and round, considerably wider than the thorax. The first segment is shining black with pale pile except on the narrow posterior margin in the middle where pile is black. The second segment has the entire posterior half forming a slight arcuate black fascia with short, erect black pile. In the middle on the basal part of the segment is a wide, diffuse, brownish-black area broadly connected with the posterior part. This leaves the lateral anterior corners extensively light yellow and pale yellowish pilose and due to the subtriangular arrangement of the middle basal blackish spot the yellow extends medially and more narrowly than at the sides. Third segment similar to the second in every respect; the posterior black fascia on either side of the median, black, triangular vittae bulges slightly forward and this anterior extension is low and broadly rounded. The pile on this segment, as in the preceding one, is black over the black areas but also over the median or postero-median extension of the yellow color but elsewhere is yellow. The fourth segment is entirely shining black with wholly erect, long, pale yellow pile; the posterior half of the segment is transversely concave from side to side, the hypopygial pile is entirely black.

Legs: all of the femora and tibiae except the narrow apices of the one and the apices of the other, dark, shining, mahogany-brown; the pile of the tibiae is wholly black or very dark brown and on the femora chiefly black, except that there is some yellow pile on the posterior surface basally of all the femora, and the entire dorsal surface and ventral surface basally of the hind femora has long yellow pile. The first two joints of all the tarsi are light orange, the middle tarsi is more yellowish and their pile golden; the apical tarsal joints black with dark colored pile.

Wings: hyaline, marked with brown as follows: a brown cloud at the base of the third longitudinal vein, another over the anterior cross vein, another at the end of the auxiliary vein, and just beyond it a small brown spot which widens out to occupy all of the distal portion of the marginal cell and

widens still more posteriorly to occupy the posterior adjacent section of the submarginal cell and to border both sides of the third longitudinal vein to its termination and to border more narrowly all of the subapical cross vein. The small cross vein is also bordered on either side. The marginal cell is closed and slightly bulbous.

*Holotype*: one male, St. Augustine, FLORIDA, March.

**Volucella pictoides** n. sp.

Related to *picta* Wied. Characterized by the wholly black hind femora, black facial stripe and dark brown antennae.

♀. Length 7 mm. Head: the front and face are light yellow, each with a prominent median black stripe. The cheeks are shining black, the pile of face and front yellowish-white. The black frontal stripe is black, pilose. Antennae elongate and dark brown; the dorsal surface of the yellowish arista with fifteen rays. Eyes with dense, short, dark brown pile.

Thorax: mesonotum shining black, the notopleurae, most of the mesopleurae, the propleurae and a geminate spot before the scutellum pale cream-yellow. There is a short, yellowish, sublateral vitta above the base of each wing. Scutellum pale, yellow and translucent, with dense, black pile on all of the dorsum except the basal corners.

Abdomen: broad, globular and inflated. The first segment is brown upon a linear posterior fascia restricted to the middle of the segment and this brown area extends down upon the second segment to cover somewhat more than the basal half of the second segment. Elsewhere these segments are pale yellow. The posterior fourth of the second segment in the middle and in each posterior corner is shining black but this fascia is broadly extended to twice its thickness on either side of the middle. Third segment with a wide posterior fascia, a broad median vitta and the basal corners black, the remainder yellow. Fourth segment, except for a narrow, linear, basal, sublateral fascia, entirely shining black. The black fascia of the second segment and the black vitta of the third segment, except for a narrow median extension of white pile, are all black, pilose; otherwise all of the remaining black area has erect white pile and the yellow areas have whitish pile except for a small encroachment of black pile on either side of the median vitta of the third segment.

Legs: all of the femora and tibiae, including the whole of the hind femora, except their narrow apices and bases respectively, shining black. First two joints of all of the tarsi yellow, the remaining ones almost black. Pile of hind femora, except ventrally near the apex, long and white. Pile of remaining femora largely, and of all the tibiae, black.

Wings: patterned with brownish markings, somewhat similar to other members of the group, the apical third brown with a darker spot at the end of the marginal cell, a sinus before it and after it, another inside of the subapical cross vein and the apical portion of the stigma somewhat clearer. There is a brown spot at the origin of the third vein, another covering the small cross vein, another beginning at the costal and crossing the sub-costal cell at the end of the costal cell; it continues to cross the marginal cell to occupy a portion of this cell.

*Holotype*: one female, Havana, CUBA, F. M. Hull, August 1937, on herbage.

**Planes grisea** n. sp.

Related to *chrysopressa* Hull, but distinguished by the opaque black third abdominal segment with its widely separated basal spots, and by the absence of the thick, flat, yellow abdominal pile.

♂. Length 8.5 mm. Head: front shining coppery with considerable, almost white, pubescence along the eye margins. The lower portion of the face is obscurely yellowish-white in ground color. The face is everywhere yellowish-white pubescent. The frontal pile is white; that of vertex partly black. Antennae dark brown, the third joint a little over twice as long as wide, reddish-brown basally.

Thorax: ground color brassy-black on which are four, quite faint and obscure purplish vittae. There is a pair of well developed stripes of brassy-yellow pile; continuous with these is a transverse stripe of such pile along the suture, which stripe emits on either side a sublateral and posteromesonotal stripe of the same pile. There is considerable pale pile in front of the scutellum and on the pleurae, but elsewhere the pile is black. The scutellum is brassy-black, transversely striped with a coppery reflection and has a pair of scarcely differentiated short hairs on the margin.

Abdomen: black, feebly shining, strongly striated. Second segment dark brownish-black, nearly opaque with a pair of light, somewhat obscure, yellowish-brown hemicircles on either

side, which do not reach the margin, widely separated in the middle. Third segment similar, with similar spots, that practically reach the margin. Fourth segment deep shining golden or brassy-black; pilose in the middle of basal half; with suberect brassy pile everywhere.

Legs: posterior femora shining black, the first two pairs blackish-brown on apical half, lighter brown basally and brownish-yellow narrowly at apex. All of the tibiae dark brownish-black, narrowly pale yellow at base, the middle pair perhaps lighter brown. Hind tarsi dark brown. First two joints of other tarsi pale yellow. Middle joint brown, the last joints black.

Wings: tinged with pale brown, the stigma sepia.

*Holotype*: one male, Sao Paulo, BRAZIL. Nov., 1938, (J. Lane, collector).

**Planes valeria** n. sp.

Related distantly to *vagans* Wied., this species is characterized by the subpetiolate abdomen, basally fused spots of third segment, pale anterior tarsi and tibia, yellowish scutellar margin etc.

♂. Length 9 mm. Head: front shining black, the narrow margin with pale yellow pubescence. The lower half of the face is broadly pale yellow. The whole of the face is covered with pale yellow pubescence. Frontal and vertical pile yellow. First two joints of antennae black, the third joint less than twice as long as wide, brownish-black in color, reddish ventrally near the base.

Thorax: mesonotum with four greenish vittae, the outer pair broader and interrupted at the suture, and broadly margined everywhere with a brassy color that tends to become coppery. Mesonotal pile brassy-yellow on the anterior half and forming a widely divergent stripe on the posterior two-thirds, which loses itself among short black pile. The mesonotal pile just before the scutellum is broadly brassy. Pleural and scutellar pile wholly pale; scutellum with a pair of slender pale bristles; scutellar color dark sepia with a brassy tinge. The margin narrowly brownish-yellow.

Abdomen: first segment greenish-black becoming light brown in the middle. Second dark, opaque sepia; the base narrowly and the narrow margins are light brown, leaving a pair of elongate, posteriolaterally pointed, pale yellow spots,

which do not reach the margin. Third segment similar in general color, the large pair of pale spots confluent narrowly at the base of the segment, pointed posteriorly and directed diagonally out towards the margin which they reach in almost their full length; the extreme basal corner is left dark brown. Fourth segment wholly shining greenish-black; it is black pilose mediobasally, elsewhere pale golden appressed pilose.

Legs: femora shining blackish; their apices and all of front and middle tibiae are light brownish-yellow. All of fore and middle tarsi except last one or two joints are pale yellow. Remainder of hind tibiae dark brown; their apex has a sharp spur.

Wings: pale brownish-grey; the stigma brown.

*Holotype*: one male, Sao Paulo, BRAZIL, November, 1940. (J. Lane collector).

## A New Texas Agrilus (Coleoptera: Buprestidae).

By JOSEF N. KNULL, The Ohio State University.

**Agrilus limpiae** n. sp.

♂. Resembling *A. obsoletoguttatus* Gory in size and markings, only pubescent areas much more prominent, each elytron with five spots, also sides of pronotum and ventral surface on sides containing white pubescence, front green, rest of insect olivaceous brown.

Head convex, with slight depression on vertex, surface finely granulose, finely rugose on occiput, pubescent; antennae extending nearly to hind angles of pronotum, serrate from the fourth joint.

Pronotum wider than long, much narrower at base than at apex; sides broadly rounded in front, obliquely narrowed to base; when viewed from the side, marginal and submarginal carinae are narrowly separated in front and joined back of middle; anterior margin strongly sinuate, median lobe prominent; basal margin emarginate at middle of each elytron, median lobe deeply emarginate; disk convex with two median depressions, also oblique depression each side, prehumeral carinae sharp; surface finely transversely rugose, fine punctures between rugae. Scutellum transversely carinate.

Elytra wider than base of pronotum; sides subparallel at base, constricted at middle, obliquely narrowed, apices rounded, serrulate; disk flattened, each elytron with vague costa, basal

depressions prominent, sutural margin elevated posteriorly; surface imbricate.

Abdomen beneath finely densely punctate, first segment slightly flattened at middle, rugose, suture between first two segments not indicated at sides; pygidium carinate, carina not projecting. Prosternum granulose, densely pubescent; prosternal lobe deeply emarginate. Tibiae slender, first and second pairs mucronate on inside at apex. Posterior tarsi same length as tibiae; tarsal claws similar on first two pairs of legs, posterior claws with inner tooth broader, inner teeth not turned inward.

Length 6.5 mm.; width 1.8 mm.

♀. Differs from the male by having the front olivaceous, antennae shorter, posterior tarsi shorter than tibiae, tibiae not mucronate and lack of pubescence on prosternum.

*Type* male, *allotype* and *paratypes* collected from the foliage of soapberry (*Sapindus drummondi* Hook. & Arn.) in the Davis Mountains, TEXAS, July 2, 1940; paratypes from the same locality ranging in dates from June 1 to July 12, D. J. and J. N. Knull collectors. Type, allotype and paratypes in writer's collection, paratypes in collections of The Ohio State University and Philadelphia Academy of Natural Sciences.

According to Fisher's key* this species would run to *A. obsoletoguttatus* Gory. It can be separated by being more olivaceous, pubescence more prominent, male posterior tarsi of about same length as tibiae and by the structure of the male genitalia. The lateral lobe of the aedeagus is serrate on outer margin near apex, otherwise this organ is similar to that of *A. obsoletoguttatus* Gory.

The writer is indebted to Mr. C. A. Frost, who kindly compared specimens with the type series of *A. interruptus* Lec.

## Yellow Fever.

Attention now centers on jungle yellow fever which is the same disease as urban yellow fever but with this distinguishing epidemiological characteristic, that in its special forest environment it is not transmitted by *A. egypti.* Risk of yellow fever epidemics will remain as long as jungle yellow fever persists. A complete extermination of the disease now seems remote if not impossible. — Annual Report 1940, International Health Division, The Rockefeller Foundation, pp. 12-13. (1941).

* W. S. Fisher, U. S. National Mus. Bul. 145, pp. 1-347, 1928.

# Dragonflies New to the Mount Desert Island Region, Maine (Odonata).

By Ranger-Naturalist CARSTEN AHRENS, Acadia National Park, Maine.

In ENTOMOLOGICAL NEWS for May, 1891, D. J. Bullock published brief notes on 8 species of dragonflies collected on Mt. Desert Island, Maine. In the same publication, October, 1894, Dr. P. P. Calvert listed 5 species collected by Bullock in this same region. Then in 1938, William Proctor, D. Sc., published the *Insect Fauna,* Part VI of the *Biological Survey of the Mount Desert Region.* In this volume is an annotated list of 54 species of dragonflies taken over a period of years (1927-1938). The three lists mentioned above include 55 species.

During the months of July and August of 1940 and 1941, the writer was a ranger-naturalist in the Acadia National Park, which is located on Mount Desert Island, Maine. During this period and for this region he raised the number of species from 55 to 80. Of the 25 species that are new records for the Mount Desert Region, 2 seem to be new records for the state of Maine. They are *Aeschna sitchensis* Hagen and *Sympetrum danae* Sulzer.

The writer wishes to thank Park-naturalist Maurice Sullivan of the Acadia National Park for his encouragement and helpfulness; to express again his appreciation to Mrs. Leonora K. Gloyd for going over the collection to check his identifications; to thank Dr. Donald Borror for literature. He also wishes to express his appreciation and admiration to Mrs. Ahrens who in two short seasons became an expert collector, and who never complained even when entomological paraphernalia covered every flat surface in the apartment.

## ANISOPTERA.

1. HAGENIUS BREVISTYLUS Selys. Fairly common along Echo Lake and Jordan Pond, July 29-Aug. 14. Observed occasionally at the outlets of lakes, 1940, 1941.

2. DROMOGOMPHUS SPINOSUS Selys. A pair taken along Great Pond on Aug. 28, 1940. Several observed squatting on

the sand and rocks along or near the shore during late Aug. 1941.

3. LANTHUS ALBISTYLUS Hagen. Four males captured along the little stream that flows into boggy New Mill Meadow, July 16-Aug. 18. They fly close to the water, alighting frequently on the rocks that break the surface, 1940, 1941.

4. L. PARVULUS Selys. One male, Jordon Pond, July 19, 1940; one male at the beaver dam on Norway Drive, Aug. 7, 1940.

5. EPIAESCHNA HEROS Fabricus. One female taken while she was ovipositing along a heavily shaded part of Squid Creek, July 8, 1940.

6. AESCHNA SITCHENSIS Hagen. Two males captured on the bog at Sea Wall, Aug. 14, 1940. These insects were observed at the very edge of the bog, distant from the pools of standing water.

7. AE. EREMITA Scudder. Fairly common in diverse habitats during late July and early Aug., 1940, 1941.

8. MACROMIA ILLINOIENSIS Walsh. Observed this species on a number of occasions during both summers as it patrolled the shady carriage roads. One male netted July 3, 1941.

9. SOMATOCHLORA TENEBROSA Say. Collected this insect now and then along shady streams during Aug., 1940, 1941.

10. S. MINOR Calvert. Two females were collected while they were ovipositing along a tiny stream that flows into Aunt Betty Pond, Aug. 14, 1940.

11. S. WALSHI *Scudder.* One male taken in the wide marshy area of lower Northeast Creek, July 21, 1941; one male, Schoodic Peninsula, July 29, 1941.

12. S. FORCIPATA *Scudder.* One female, Echo Lake, July 3, 1940.

13. S. WILLIAMSONI E. M. Walker. One male, lower Northeast Creek, July 21, 1941.

14. S. KENNEDYI E. M. Walker. One male, Echo Lake, July 3, 1941.

15. CELITHEMIS MARTHA Williamson. This species was less common than was C. *elisa,* but it was found in its company

around all the lakes during early and middle Aug., 1940. It was not observed during the summer of 1941, although C. *elisa* was common.

16. LADONA JULIA Uhler. Fairly common about the pools of standing water at the bog at Sea Wall during the first two weeks of Aug., 1940, 1941.

17. LIBELLULA PULCHELLA Drury. Common at Sargent Pond and at the beaver dam on Norway Drive during Aug., 1940, 1941.

18. SYMPETRUM DANAE Sulzer. Four males were netted in a tide swamp behind a sea wall on Great Duck Island, Aug. 3, 1940.

19. S. SEMICINCTUM Say. Fairly common in the New Mill Meadow during middle Aug., 1940, 1941. They are usually in the company of *Nannothemis bella* Uhler.

20. S. DECISUM Hagen. Found almost everywhere during July and Aug., 1940, 1941.

21. PANTALA FLAVESCENS Fabricus. Observed frequently during Aug. in Bar Harbor, 1940, 1941.

ZYGOPTERA.

22. LESTES EURINUS Say. Taken occasionally at the bog at Sea Wall during the first two weeks of Aug., 1940, 1941.

23. L. RECTANGULARIS Say. Netted frequently during the latter part of July and early Aug., 1940, 1941.

24. ENALLAGMA VESPERUM Calvert. Three males collected at Aunt Betty Pond, Aug. 7, 1940.

25. E. ASPERSUM Hagen. Fairly common during the first week in Aug., 1940, 1941.

## Why Does Gyrinus Circle? (Coleoptera: Gyrinidae).

By CYRIL E. ABBOTT, Harding College, Searcy, Arkansas.

Several years ago a friend of mine attempted to determine the origin and function of the circular locomotion of the Gyrinidae. He finally decided that the beetles were not compelled to behave in that manner, and that the motion is "instinctive".

Now, the definition of behavior as instinctive really explains nothing, excepting that we have no adequate explanation. And so, after reading the paper by Brown and Hatch (1929) it occurred to me that circling might possibly be the result of visual responses. But when rather complex apparatus for testing such responses gave absolutely no positive results, the problem appeared, for a time, insoluble.

In the meantime I obtained and read a copy of the monograph on chordotonal organs by Eggers (1928). Eggers succeeded in demonstrating experimentally that the Gyrinidae avoid collision with solid objects through the perception of vibrations of the water's surface, and that the sense organs concerned are located in the second segment of each antenna. This recalled the familiar observation that when a small moth or other similar insect falls upon the water in the vicinity of a number of "whirligig" beetles, the latter soon surround it and tear it to pieces. For the Gyrinidae are predatory in both the larval and adult stages.

The foregoing observations suggested the experiments described below. From the moveable arm of an electric vibrator having a frequency of 60/sec. an iron ball weighing about 25 gms. was suspended on a 20 B & S guage wire about two feet in length. A large aquarium tank was so arranged that the weight hung about four inches below the surface of the water. About thirty specimens of *Gyrinus* (sp?) were then placed in the tank, and a screen so arranged that their movements could be observed without subjecting them to visual stimuli. Using this apparatus the following experiments were performed:

1. The beetles were observed for some time with the vibrator motionless. Under such circumstances the beetles circled aimlessly all over the exposed water's surface.

2. The vibrator was set in motion. Immediately, the beetles nearest the wire turned toward it, swam up to it, and made grasping movements with the prothoracic legs. And although the vibration of the wire flung each insect a distance of a centimeter or two, the beetle immediately repeated its orienting

and grasping movements. These "attempts", in the case of single specimens, were repeated at intervals of about two seconds.

3. The vibrator was stopped. The beetles at once began to wander all about the tank; if anything, they avoided the wire.

4. With the aid of a pair of fine forceps antennae were removed from fifteen beetles; these alone were replaced in the tank. When the vibrator was started the beetles paid no more attention to it than when it was motionless; that is, they wandered aimlessly all over the tank. One or two made a feeble and occasional attempt to seize the wire, but subsequent examination indicated that two or three specimens had parts of the antennae still attached.

The experiments described were repeated many times, under various circumstances: always the results were the same as there indicated. *Normal* beetles also oriented to tuning forks with vibration rates of 256/sec., 320/sec., and 384/sec., *when each of these was touched to the surface of the water.* Under no circumstances did any of the beetles respond to air vibrations alone, although efforts were made to induce such a response. Needless to say, beetles with amputated antennae did not respond to the forks under any circumstances.

Of further interest is the fact that Gyrinus made no orienting movements toward the vibrating object when and if that object was more than three or four centimeters from the insect.

Now the activities of the Gyrinidae in the adult stage are chiefly confined to the surface of the water, where they feed, as has been observed, upon hapless winged insects falling thereon, and which, through their struggles, set up a vibration of that surface; by means of such vibrations Gyrinus reaches its prey. But evidently the perception of such minute and rapid vibrations is effective only within a very limited area around the source of the vibration. By *circling,* Gyrinus greatly increases the area of surface which it covers in a given time, and hence, naturally increases its *chances* of encountering vibrations set up on the surface of the water.

In short, the circling beetle is literally "feeling for prey". And the organs upon which it depends for the discovery are the antennae.

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BROWN, C. R. and M. H. HATCH. 1929. Orientation and fright reactions of whirligig beetles.—Jour. Compar. Psychol., 9: 159-189.

## The Dates of Publication of Two Articles on Coleoptera by John L. Leconte, Issued in 1845.

By HUGH B. LEECH[1], Vernon, British Columbia.

In examining the literature on one of Leconte's species, it was found that the original description was cited variously as of 1844, 1845, 1846 and 1847. Since beetles belonging to four families[2] date from the same article, the following notes may be of interest.

The two papers in question are Leconte's "Descriptions of some new species of coleopterous insects inhabiting the United States", in the *Proceedings of the Boston Society of Natural History,* Volume I, page 201; and his "Descriptions of some new and interesting insects, inhabiting the United States", in the *Boston Journal of Natural History,* Volume V, No. 2, pages 203-209. Although having a different title, the first paper is in fact merely an abstract of the second, giving the preliminary diagnoses of the species, but not the fuller descriptions and references. The second article is accompanied by a fine plate (No. 18) illustrating the species, and opens with a diatribe against American entomologists who sent their new species to Europe for description.

The title page of Volume I of the *Proceedings of the Boston Society of Natural History* is dated 1844. However, at the bottom of page 201 there is a printer's signature:

[1] Contribution No. 2080, Division of Entomology, Science Service, Department of Agriculture, Ottawa, Ontario.

[2] Cicindelidae: *Cicindela audubonii* Leconte. Carabidae: *Calosoma triste* Lec., *C. lepidum* Lec., *Scarites patruelis* Lec., *S. affinis* Lec., *S. ephialtes* Lec., *S. intermedius* Lec. Dytiscidae: *Dytiscus marginicollis* Lec. Cerambycidae: *Lamia bellii* Lec. ( = *Plectrodera scalator* Fab.).

"Proceedings B.S.N.H. 22 March, 1845," which indicates that the volume was not published in 1844. On page 200 there is a paper by Richard Soule, Jr., "giving an account of experiments on the juice of Cornstalk, made Sept. and Oct. 1844"; it seems unlikely that the volume was published between that time and the end of the year. Fortunately the *Proceedings of the Academy of Natural Sciences of Philadelphia* contain records of accessions to the Academy's Library; the second half of Volume I of the Boston *Proceedings* (page 129 to end), was noticed at the stated meeting on September 2, 1845. As the previous stated meeting was on August 19, 1845, we have a fairly good indication of the time when these pages were mailed.

The title page to Volume V of the *Boston Journal of Natural History* is dated 1847. In the minutes of the meeting of the Boston Society of Natural History on October 15, 1845, the following statement occurs: "Dr. Gould announced that a new number of the *Journal,* being the second this year, was ready for distribution". This gives us the approximate date of publication. Referring again to the *Proceedings* of The Philadelphia Academy, we find that in the minutes of the stated meeting on December 16, 1845, Volume 5, No. 2 (really a Part) of the *Boston Journal of Natural History* is listed among the donations to the library. In the minutes of a meeting on May 6, 1845, Volume 5, No. 1 is listed as received.

Thus it appears that the Lecontean species of beetles described in these papers must all be cited as of 1845, the actual date of publication of the abridged paper being not long before September 2. It is unfortunate that the second paper did not appear first, since it contains the full descriptions and their accompanying illustrations; however, we do know that it was published between October 15 and December 16, 1845.

*Acknowledgment.* It is a pleasure to mention the cordial help of Dr. Richard Dow, of the Boston Society of Natural History. He searched through the older journals not available to me, and provided information from which the above notes on dates of publication were made.

# Current Entomological Literature

COMPILED BY L. S. MACKEY, R. G. SCHMIEDER, A. G. RICHARDS, JR. and JOHN W. H. REHN.

Under the above head it is intended to note papers received at the Academy of Natural Sciences of Philadelphia pertaining to the Entomology of the Americas (North and South), including Arachnida and Myriopoda. Articles irrelevant to American entomology will not be noted; but contributions to anatomy, physiology and embryology of insects, however, whether relating to American or exotic species will be recorded.

This list gives references of the current or preceding year unless otherwise noted. All continued papers, with few exceptions, are recorded only at their first installment.

For records of Economic Literature, see the Experiment Station Record, Office of Experiment Stations, Washington. Also Review of Applied Entomology, Series A, London. For records of papers on Medical Entomology, see Review of Applied Entomology, Series B.

Note. References to papers containing new forms or names not so stated in titles are followed by (*); if containing keys are followed by (k); papers pertaining exclusively to neotropical species, and not so indicated in the title, have the symbol (S) at the end of the title of the paper.

The figures within brackets [ ] refer to the journal in which the paper appeared, as numbered in the list of Periodicals and Serials published in our January and June issues. This list may be secured from the publisher of Entomological News for 10c. The number of, or annual volume, and in some cases the part, heft, &c., the latter within ( ) follows; then the pagination follows the colon :

Papers published in the Entomological News are not listed.

GENERAL.—**Anon.**—Dr. Frederic Wallace Edwards (1888-1940). [105] 12: 415-416. **Banks, N.**—Report on entomology. [Ann. Rep. Dir. Mus. Comp. Zool.] 1940-41: 13-16. **Barton, D. R.**—Attorney for the insects. [Natural History] 48: 181-185, ill. **Bondar, G.**—Notas entomologicas da Baja. [105] 12: 268-303, ill. **Brown, R. W.**—Concerning the antiquity of social insects. [5] 48: 105-110. **Bruch, C.**—Walter Horn (1871-1939) Semblanza de una vida fecunda. [104] 11: 45-48, photo. **Carpenter, F. M.**—Report on fossil insects. [Ann. Rep. Dir. Mus. Comp. Zool.] 1940-41: 33. **Carter, W.**—Insects and the spread of plant diseases. [An. Rep. Smiths. Inst.] 1940. 329-342, ill. **Cockerell, T. D. A.**—Observations on plants and insects in northwestern Baja Californa, Mexico, with descriptions of new bees. [Trans. San Diego Soc. Nat. Hist.] 9: 339-352. **Davis, W. T.**—Charles William Leng. [Pro. Staten Island Inst. Arts & Sci.] 9: 75-80, ill. Natural History records from the meetings of the Staten Island Nature Club. [Pro. Staten Island Inst. Arts & Sci.] 9: 97-112. **Fester, G. A.**—Colorantes de insectos. [106] 132: 100-103. **Graham, S. A.**—Royal Norton Chapman. 1889-1939. [7] 34: 521-524, ill. **Hayward, K. J.**—Departamento de Entomologia. [Rev. Ind. & Agric. Tucuman] 31: 50-58. **Howell, T.**—Some aquatic insects from the Great Smoky Mountains National Park. [Jour. Tenn. Acad. Sci.] 16: 406-407. **Imms, A. D.**—The prickly-pear problem in Australia. [Nature] 148: 303-305,

ill. **MacLagan, D. S.**—Sunspots and insect outbreaks an epidemiological study. [Pro. Univ. Durham Philo. Soc.] 10: 173-199, ill. **Soraci, F. A.**—Important nursery insects of New Jersey. [N. J. Dept. Agric.] Circ. 326: 72 pp., ill. **Stunkard, H. W.**—In Memoriam, Adolpho Lutz. [Jour. Parasit.] 27: 469-471. **Vargas, L.**—Aplicación taxonómica de un método estadístico. [Rev. Inst. Salubridad y Enferr Trop.] 2: 123-128, ill. **Wolcott, G. N.**—A supplement to "Insectae Borinquenses". [Jour. Agric. Univ. Puerto Rico] 25: 33-158.

**ANATOMY, PHYSIOLOGY, ETC.**—**Caspari, E.**—The morphology and development of the wing pattern of Lepidoptera. [Q. Rev. Biol.] 16: 249-273, ill. **Eder, R.**—Die kutikuläre Transpiration der Insekten und ihre Abhangigkeit vom Aufbau des Integumentes. [Zool. Jahrb., Abt. allg. Zool.] 60: 203-240. ill. **Evans, T. C.**—Sequence of roentgen ray effects on the development of the grasshopper egg. I. [Phys. Zool.] 14: 163-173. ill. **Ford, E. B.**—Studies on the chemistry of pigments in the Lepidoptera, with reference to their bearing on systematics. The Anthoxanthins. [107] 16: 65-90. **Gosswald, K.**—Über den Einfluss von verschiedener Temperatur und Luftfeuchtigkeit auf die Lebensäusserungen der Ameisen. II. Über den Feuchtigkeitssinn ökologisch verschiedener Ameisenarten und seine Beziehung zu Biotop, Wohn-und Lebensweise. [94] 154: 247-344, ill. **Hall, H. F.**—A note on terminology regarding intersexes. [J. Hered.] 32: 309, 314. **Hanstrom, B.**—Inkretorische organe, sinnes-organe und nervensystem des kopfes einiger niederer insektenordnungen. [Kungl. Svenska Vetenskapsakad. Handlingar] 18: 266 pp., ill. **Hardman & Craig.**—A physiological basis for the differential resistance of the two races of red scale to HCN. [68] 94: 187. **Harpster, H. T.**—An investigation of the gaseous plastron as a respiratory mechanism in Helichus striatus Leconte (Dryopidae). [Trans. Amer. Micr. Soc.] 60: 329-358, ill. **Jeschikov, J.**—Die Dottermenge im Ei und die Typen der postembryonalen Entwicklung bei den Insekten. [34] 134: 71-87, ill. **Mazek-Fialla, K.**—Die Körpertemperatur poikilothermer Tiere in Abhängigkeit vom Kleinklima. [94]: 154: 170-246, ill. **Prebble, M. L.**—The diapause and related phenomena in Gilpinia polytoma. [Can. Jour. Res.] 19 (Sec. D): 295-346, ill. **Rifenburgh, S. A.**—Certain genetic effects of short-wave ultra-violet radiation on Drosophila melanogaster. [Lloydia] 4: 65-76. **Roberts, H.**

R.—A comparative study of the sub-families of the Acrididae primarily on the basis of their phallic structures. [Pro. Acad. Nat. Sci. Phila.] 93: 201-246, ill. **Yeager & Munson.**—Histochemical detection of glycogen in blood cells of the southern army-worm (Prodenia eridania) and in other tissues, especially midgut epithelium. [47] 63: 257-294, ill.

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